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McMURTREY (J. E.). **Boron deficiency in Tobacco under field conditions.** —*J. Amer. Soc. Agron.*, xxvii, 4, pp. 271–273, 1 fig., 1935.

In field experiments carried out in Maryland, the use for a five-year-period of relatively pure chemicals in the preparation of tobacco fertilizer mixtures resulted in the development of pronounced boron deficiency symptoms [*R.A.M.*, xiii, p. 600]. The first indication of the disturbance is a pallor of the bud leaves, especially at the base, rapidly followed by more or less extensive collapse of the tissues. Near the top of the plant growth may be unilateral or contorted. The final manifestation is a die-back of the terminal bud. Lateral buds (suckers) may develop in the leaf axils or at the base of the stalk, but they usually break down in a similar manner.

PETRE (A. W.). **Factors influencing the activity of Tobacco mosaic virus preparations.**—*Contr. Boyce Thompson Inst.*, vii, 1, pp. 19–28, 1 fig., 1 diag., 1935.

The author briefly describes certain improvements in Vinson's and Petre's lead precipitation method for the separation and purification of the tobacco mosaic virus from tobacco leaves [*R.A.M.*, x, p. 761]. It was shown that the removal of the pigment, which occurs in greater concentration in sap from field-grown tobacco plants, was facilitated by increasing the concentration of potassium acid phosphate in the preliminary elution; the activity of the virus removed in the final eluate was increased by increasing the acidity of the potassium acid phosphate buffer in the preliminary elution, but this was less effective in removing the pigment. In the final elution, the lead acetate precipitates from juice of field-grown tobacco plants required an alkaline phosphate buffer of higher P_H than 6·5 to exhibit their full activity, good results being obtained at P_H values of 7·5 and 8·4.

The experiments also indicated that tobacco plants grown in glass cages were less susceptible to infection with tobacco mosaic and more succulent than plants grown in the greenhouse, suggesting an inverse relationship between succulence of the plants and their susceptibility. Rate of leaf expansion (growth) did not appear to be a factor in susceptibility.

VALLEAU (W. D.). **A probable case of sulphur starvation in Tobacco.**—*Phytopathology*, xxv, 4, pp. 430–432, 1 fig., 1935.

An unusual form of apical chlorosis of the upper first to third leaves of topped White Burley tobacco plants [cf. *R.A.M.*, xiv, p. 534] observed in Kentucky in 1934 is tentatively attributed to sulphur deficiency [ibid., xi, p. 805]. In some cases the greyish-yellow discoloration extended well down along the edges of the leaves. The affected plants were growing in hard, cracked soil in hilly areas liable to extensive erosion. The chlorotic portions of the foliage turned chamois- to honey-yellow (Ridgway) on curing, in contrast to the normal cinnamon-brown. Chemical analyses supported the conclusion regarding a low sulphur content in the affected leaf tips, which were further deficient in various other elements, including phosphorus, magnesium, potassium, and calcium [cf. ibid., viii, p. 473; xii, pp. 731, 732].

BERKELEY (G. H.). **Occurrence of 'spotted wilt' of Tomato in Canada.**—*Sci. Agric.*, xv, 6, pp. 387–392, 3 pl., 1935. [French summary.]

Since 1931 a disorder suspected to be spotted wilt of tomatoes has been present in Ontario, but only in 1934 was it possible to undertake experimental studies which showed conclusively that this or a very closely related disease is present in that Province and Saskatchewan.

The symptoms are briefly described and differentiated from those of streak [*R.A.M.*, xiv, p. 404], the relevant literature is summarized, and notes are given on the distribution and importance of the disease. Positive results were given by inoculation experiments on Standup Resistant tobacco plants, *Nicotiana glutinosa*, *Petunia*, and Grand Rapids tomatoes. The period of potency of the virus under investigation at St. Catharines appears to be only from ½ to 2 hours; it is inactivated by 10 minutes' heating at 45° C. Control should be based on the removal of diseased material and, in the greenhouse, on the extermination of the insect vectors, *Thrips tabaci* and *Frankliniella insularis* [ibid., xiii, p. 190].

MAGEE (C. J.). **Bacterial canker of Tomatoes.**—*Agric. Gaz. N.S.W.*, xlvi, 4, pp. 192–194, 4 figs., 1935.

A brief, popular account is given of the symptoms, manner of infection, and control of tomato bacterial canker (*Aplanobacter michiganense*), which has recently appeared in New South Wales. The control measures recommended consist in the use of seed from clean crops, or isolated clean parts of the crop, its extraction by fermentation with the pulp, without water, for at least three days [*R.A.M.*, xiii, p. 478], the disinfection of commercial seed [ibid., xiii, p. 403], and improved sanitary methods.

FISH (S.) & PUGSLEY (A. T.). **Tomato leaf mould recorded in Victoria.**—*J. Dep. Agric. Vict.*, xxxiii, 4, pp. 188–190, 2 figs., 1935.

After stating that tomato leaf mould (*Cladosporium fulvum*) was first noticed in Victoria in the spring of 1934, when it appeared in three glasshouses in different areas, the authors give a brief, popular account of the disease and its control [*R.A.M.*, xiii, p. 496; xiv, p. 202].

GRAVES (A. H.). **Forest pathology.**—*Rep. Brooklyn bot. Gdn, 1934* (*Brooklyn bot. Gdn Rec.*, xxiv, 2), pp. 59–63, 1935.

Further notes are given on the hybrids between certain Japanese and Chinese chestnuts (*Castanea crenata* and *C. mollissima*) and the American (*C. dentata*) made for the purpose of combining the comparative resistance to blight (*Endothia parasitica*) of the former with the desirable timber qualities of the latter [*R.A.M.*, xii, p. 601]. Successful crosses have been made, *inter alia*, between two Smith hybrids (*C. crenata*×*C. dentata*) and *C. dentata*, 12 *C. mollissima* and *C. dentata*, 19 *C. mollissima* var. Mammoth and *C. dentata*, 7 *C. mollissima* and the dwarf Chinese *C. seguinii*, and 4 Japanese forest type (*C. crenata* var.) and *C. dentata*. As far as resistance to blight is concerned, *C. mollissima* has been found to be the finest stock, none of the 15 trees under observation for the past six years having shown a trace of infection. The total of Japanese-American hybrid chestnuts now growing at Hamden is 97.

BOSE (S. R.). **Cytology of secondary spore formation in Ganoderma.**—*Phytopathology*, xxv, 4, pp. 426–429, 2 figs., 1935.

The author has frequently observed in *Ganoderma lucidum* [*R.A.M.*, xiv, p. 532] and *G. applanatum* [ibid., xiv, p. 578] at Calcutta the formation of secondary spores indistinguishable from ordinary basidiospores in shape, size, and spore wall ornamentation [cf. ibid., xii, p. 777]. The same phenomenon, the cytology of which is discussed, was noticed in November and December, 1931, in *Trametes lactinea* and *Polyporus calcuttensis* Bose, and during the abnormally dry spell of August, 1934, in *P. ochroleucus* [ibid., v, p. 452].

SMUCKER (S. J.). **Air currents as a possible carrier of Ceratostomella ulmi.**—*Phytopathology*, xxv, 4, pp. 442–443, 1935.

The results [which are tabulated] of a preliminary experiment with uniformly distributed agar plates in a tightly closed auditorium at one end of which cultures of *Ceratostomella ulmi* [*R.A.M.*, xiv, p. 537] were fanned for five minutes with a small piece of cardboard indicate that the conidia of the fungus may be air-borne to distances of up to 40 ft., this being most readily effected with a five-day-old agar plate culture—though positive results were also obtained with a ten-day-old culture on moist elm blocks and even with a dried one of 24 days on dry elm wood. Control plates exposed in the same room before the fanning test remained sterile. Other trials show that infection may follow the lodging of viable spores in a favourable site, such as a fresh wound in an elm tree.

HIRANE (S.). **Some remarks on the fungus Uromyces hyalosporus Sawada.**—*J. Soc. trop. Agric. Taiwan*, vi, 4, pp. 683–685, 1 fig., 1935.

Uromyces hyalosporus Sawada produces on the phyllodes of *Acacia confusa* in Formosa ruddy-brown, later greenish-yellow, discoid tubercles on which develop successively large numbers of shiny black, punctiform, hemispherical pycnidia, 95 to 150 μ in diameter, containing hyaline, ovoid or ellipsoid pycnospores, 4 to 6 by 3 to 4 μ; dark brown uredosori, 0·3 to 0·8 mm. in diameter, bearing golden-brown, fusiform or long-

ellipsoid, pitted or reticulate, pedicillate, paraphysate uredospores, 32 to 83 by 22 to 33 μ; and watery- to greyish-white teleutosori, velvety at maturity, sometimes intermixed with the uredospores, averaging 0·3 to 1 mm. in diameter and producing ellipsoid to elongated-ellipsoid, hyaline, clavate, smooth-walled teleutospores, 41 to 55 by 16 to 28 μ, furnished with hyaline pedicels, 60 to 120 by 5 to 9 μ, and cylindrical, fusoid to elongated-fusoid paraphyses, 45 to 95 by 16 to 25 μ.

Various important points in the morphology and life-cycle of the rust under discussion are stated to have been omitted from Sawada's original description (*Bot. Mag.*, xvii, p. 16, 1913), necessitating further studies on its systematic position, pending the results of which Dietel's transference of *U. hyalosporus* to the genus *Maravalia* as *M. hyalospora* (Sawada) Diet. (*Ann. Mycol., Berl.*, xxii, p. 269, 1924) should, in the writer's opinion, be provisionally accepted.

HANSBROUGH (J. R.). **A new canker disease of Red Pine caused by Tympanis pinastri.**—*Science*, N.S., lxxxi, 2104, p. 408, 1935.

The silviculturally important red or Norway pine (*Pinus resinosa*) was observed in the winter of 1932–3 to be dying over a small area of the Eli Whitney Forest, New Haven, Connecticut, as a result of cankers caused by *Tympanis pinastri*. The small, black, ovate or spherical pycnidia, and disk-shaped, stalked apothecia of the fungus are stated to be readily overlooked unless they are the object of a special search. It causes elongated cankers, with or without definite margins and with depressed centres, becoming roughened and open after two or three years, round the nodes of the lateral branches, whence they may spread into the stem on the weakening of the host by some environmental factor—the severe drought of 1930 in the case under observation. The fungus has also been found on *P. strobus* trees which were in very poor condition. Positive results were given by inoculations on *P. resinosa* with pure cultures of *T. pinastri* from both hosts. Infection is most prevalent in pure stands of *P. resinosa*, the lower crown classes being much more susceptible than the upper ones.

GRAVES (C. E.). **Controlling fungous sap stains of lumber by use of mercurial fungicide treatments.**—*Agric. News Lett.*, iii, 3, pp. 6–8, 1935. [Mimeographed.]

To prevent blue staining of timber [*Ceratostomella* spp., and other fungi: *R.A.M.*, xiv, p. 275] during the early part of the air-seasoning period the lumber on coming from the saw-mill was until recently treated in America with soda solution (5 per cent. at least, at 150° to 175° F.); the treatment, however, imparted a yellowish colour to the wood and frequently injured the hands of the men. A successful substitute has now been found in ethyl mercury chloride [ibid., xiii, p. 341], which has been so well received that in 1934 the Du Pont Company distributed sufficient to treat about one and a half billion board feet. At the concentration recommended the fluid is non-injurious. It is equally effective against the organisms attacking hardwoods and pine, and both kinds of wood can be dipped in the same vat.

A new compound, LE-5, containing oil-soluble ethyl mercury oleate was also effective against sap-stain fungi. Used in an emulsifiable oil it

can be mixed with water and applied to lumber in the same way as the older treatments. It is also being used as a preservative for cordage.

SCHUMANN (K.). **Bor-Superphosphat und Bor-Am-Sup-Ka gegen Herz- und Trockenfäule der Rüben.** [Boron-superphosphate and bor-am-sup-ka against heart and dry rot of Beets.]—*Dtsch. landw. Pr.*, lxii, 14, p. 171, 1 fig., 1935.

A brief note is given on heart and dry rot of beets and its control in Upper Bavaria by the application of a mixture of boron and superphosphate, with or without the addition of ammonia and potash [cf. *R.A.M.*, xiv, p. 551]. With a well-balanced fertilizer the amount of boron required is stated to be only 5 kg. per 0·34 hect.

SNYDER (W. C.). **St. John's disease of Pea in Europe.**—*Zbl. Bakt.*, Abt. 2, xci, 22–26, pp. 449–459, 2 figs., 1935.

An analysis of the species of *Fusarium* associated with the 'St. John's disease' of peas [*R.A.M.*, xiv, p. 486] found by the author during a survey in 1934 in Central Europe (especially Germany) is fully described. Originally applied to a single disease attributed to *Fusarium vasinfectum* var. *pisi*, the name 'St. John's disease' has come to be used for a complex of pea disorders characterized by the general symptoms of yellowing and premature death. Even diseases due to entirely different causes, such as the *Ascochyta* foot rots [*A. pisi*, *Mycosphaerella pinodes*, and *A. pinodella*: see next abstract] and mosaic or allied conditions of virus origin [ibid., xiv, p. 486], are liable to inclusion under this term.

The following species of *Fusarium* were isolated from peas showing pathological symptoms: *F. redolens*, *F. solani* v. *martii* f. 2, *F. oxysporum* f. 8, *F. herbarum* v. *avenaceum*, and *F. culmorum*. Inoculation experiments showed that the foot and root rot of peas caused by *F. solani* v. *martii* f. 2 is identical with the *Fusarium* root rot of peas caused by this organism in the United States [ibid., xiv, p. 334]; *F. solani* v. *striatum*, described as a virulent parasite of peas in Holland, is considered to be the same fungus. Evidence is adduced to show that the isolations of *F. oxysporum* from diseased peas in Europe (Italy and Germany) agree with *F. oxysporum* f. 8, the agent of 'near wilt' in the United States [ibid., xiv, p. 486]. The name 'St. John's wilt' is used to differentiate this disease from the group usually designated as 'St. John's disease', the former being regarded as identical with 'near wilt'. The American pea wilt (*F. orthoceras* v. *pisi*) has not yet been found in Europe. *F. redolens*, *F. herbarum* v. *avenaceum*, and *F. culmorum* have not yet been adequately tested by the writer for pathogenicity to peas, but the results obtained with them by other workers indicate that, under certain cultural conditions, they may be factors in the causation of disease. *F. redolens* was the species most frequently isolated in Germany.

SPRAGUE (R.). **Ascochyta boltshauseri on Beans in Oregon.**—*Phytopathology*, xxv, 4, pp. 416–420, 1935.

Ascochyta boltshauseri was isolated from snap beans (*Phaseolus vulgaris*) [*R.A.M.*, x, p. 284] in Oregon in September, 1932, this being

apparently the first record of its occurrence in the United States. The mottled grey to buff, flocculent cultures on potato-dextrose agar somewhat resembled those of *A. pisi* from *Vicia villosa* [ibid., ix, p. 273; cf. also xiv, p. 547]. The unpublished results [here briefly discussed and tabulated] of inoculation experiments conducted at Cincinnati, Ohio, from 1926 to 1929 with *A. pisi*, *Mycosphaerella pinodes*, and *A. pinodella* showed that neither *M. pinodes* nor any of the three physiologic forms of *A. pisi* were able to attack *P. vulgaris*, though *P. aconitifolius* and *P. aureus* were slightly susceptible to all three organisms from peas. The [tabulated] data of inoculation tests at Corvallis, Oregon, with the local strain of *A. boltshauseri* show that, of the various Leguminosae used, only *P. vulgaris* (Red Valentine, Boston Navy, and Bush Black Valentine varieties), *P. aureus*, *P. angularis*, and *P. coccineus* were susceptible.

While certain forms of *A. pisi* approximate in spore dimensions to those of *A. boltshauseri* (the spores of which from local material in nature averaged 18 by 4·5 μ for the uniseptate and 21·5 by 5·6 μ for the 15 to 20 per cent. that had 2 to 5 septa), the two differ in the colour of the lesions produced (pale, red-bordered in the former and dark or drab, zonate in the latter). *A. boltshauseri* and *M. pinodes* are considered to be sufficiently distinguished by their wide difference in spore size and divergent host range. *Stagonopsis phaseoli* Eriks., a European bean parasite, appears from a study of the type material to be unquestionably identical with *A. boltshauseri*, the latter name being retained on grounds of priority. The writer has previously adduced evidence for the invalidity of the genus *Stagonosporopsis* [ibid., ix, p. 273], and he is thus of the opinion that the combination *S. hortensis* (Sacc. & Malbr.) Petrak [ibid., i, p. 152] is untenable. *Stagonospora hortensis* Sacc. & Malbr. may be identical with *A. boltshauseri*, but in the absence of type material such a conclusion would be hazardous. *S. phaseoli* Dearness [ibid., viii, p. 66] is characterized by pale, red-bordered lesions and multiseptate spores and is distinct from *A. boltshauseri*.

Fahmy (T.). **The rust of Cowpea. (Part I.) The disease.**—*Bull. Minist. Agric. Egypt* 144, 10 pp., 9 pl., 1935.

In this account of his investigations into cowpea (*Vigna sinensis*) rust (*Uromyces vignae*) [*R.A.M.*, xii, p. 747; xiii, p. 319] in Egypt the author states that Asmerli (the most important local variety) and Baladi are both susceptible to rust and root knot [*Heterodera marioni*], while the third variety grown locally, Hifnawi, is resistant to the former disease but very susceptible to the latter. As the weather cools and the atmospheric humidity increases infection becomes most severe during the period of seed formation between September and October. Heavy infections of susceptible varieties can be avoided by sowing from March to April, but the crops then require longer to mature than later ones and may suffer from other disadvantages.

The minute, round, bright yellow pycnidial spots appear on the leaves, mostly on the upper surface, and to a less extent on the leaf petioles and stems, about July; soon afterwards, clusters of pale yellow aecidia appear in circles, mostly on the lower surface. The dark brown uredosori and still darker (almost black) teleuto pustules follow successively,

occurring on both sides of the leaf. The fungus is stated to be identical with that found on cowpea in Virginia [ibid., iii, p. 566].

WELLMAN (F. L.). **The host range of the southern Celery-mosaic virus.**—*Phytopathology*, xxv, 4, pp. 376–404, 1935.

Inoculation experiments, supplemented by field observations, principally in Florida, have shown that the southern celery mosaic virus (celery virus 1) [*R.A.M.*, xiv, p. 553] can attack at least 91 different hosts, 46 of which were found spontaneously infected under natural conditions. Among the 29 susceptible vegetable crops are White Spine cucumbers, common and strawberry groundcherries (*Physalis pubescens* and *P. alkekengi*), peppers (*Capsicum annuum*), Red Garden beet, spinach, New Zealand spinach (*Tetragonia expansa*), onion, pumpkin (*Cucurbita pepo*), Golden Summer Crookneck and Cocozelle squash (*C. pepo condensa*), Hubbard squash (*C. maxima*), Kleckley Sweet watermelon, West Indian gherkin (*Cucumis anguria*), Florida Highbush and Black Beauty eggplants, Globe and Marglobe tomatoes, and Porto Rico sweet potatoes (also in Cuba). Among the vegetables failing to contract infection by southern celery mosaic were cabbage, mustard, and other crucifers, garden beans (*Phaseolus vulgaris*), peas, lettuce, endive, and Irish potato.

The 23 ornamental hosts include Aztec and French marigolds (*Tagetes erecta* and *T. patula*), *Emilia sagittata*, geranium (*Pelargonium hortorum* Bailey), larkspur (*Delphinium consolida* L.), Golden and Easter lilies (*Lilium auratum* and *L. longiflorum*), *Antirrhinum majus*, Madagascar periwinkle (*Vinca rosea*), *Petunia hybrida*, and *Zinnia elegans*. The following are among the 14 susceptible weeds that may be of considerable importance in the spread of the disease: *Geranium carolinianum*, *Physalis* spp., *Ambrosia artemisifolia*, *Commelina nudiflora*, and *C. communis*. Twenty-five miscellaneous plants were also found liable to infection, including broad bean (*Vicia faba*), banana, maize, sorghum, wheat, rye, *Euchlaena mexicana*, and tobacco.

The symptoms resulting from inoculation with the virus were extremely variable. In many cases primary lesions developed both from aphid transmission and inoculation by rubbing, whereas in others only one of these two methods produced the same effects (the former, for instance, in *Chenopodium murale* and the latter in maize). Certain hosts, e.g., spinach, *D. consolida*, squash, celery, watermelon, banana, maize, tomato, tobacco, and *Antirrhinum majus*, developed severe forms of necrosis, discoloration, or distortion; in others infection was mild or was overcome by the shedding of diseased leaves, as in *Datura* spp.; while in one or two cases—eggplant occasionally and *Emilia sagittata* apparently consistently—the symptoms were entirely masked.

WOOD (F. C.). **A new disease of cultivated Mushrooms.**—*Gdnrs' Chron.*, xcvii, 2520, pp. 243–244, 1 fig., 1935.

This is a more technical note on the disease of cultivated mushrooms in England caused by a fungus determined by H. W. Wollenweber as *Fusarium solani* var. *martii* [previously referred to as *F. solani*] a popular account of which has already been noticed [*R.A.M.*, xiv, p. 346]. Positive results were given by inoculation experiments on healthy

mushrooms with spore suspensions of the fungus, which was reisolated from the infected stipes.

SHEAR (G. M.). **The growth of Agaricus campestris on plots treated with sodium chlorate.**—*Phytopathology*, xxv, 4, pp. 440–442, 1935.

At the first count on 3rd August, 1934, there were over six times as many mushrooms (*Agaricus* [*Psalliota*] *campestris*) on 30 plots in Virginia treated on 1st June with sodium chlorate (1·5 lb. per gall. water on 100 sq. ft.) against weeds as on the same number of untreated ones, while on the 16th the former bore more than four times the number on the latter. The most plausible explanation of this augmented production on the treated areas is considered to be lack of competition and consequent increase in available nutrients. Another possible interpretation may be sought in the stimulation of growth due to the decomposition of the chlorate.

BRANAS (J.) & BERNON (G.). **Contribution à l'étude du court-noué de la Vigne.** [Contribution to the study of court-noué of the Vine.]—*Rev. Path. vég.*, xxii, 1, pp. 19–24, 1935.

The results of the authors' cytological studies (using Ranghiano's technique) of healthy and court-noué vine (Aramon) shoots indicate that the structures in healthy and diseased tissues regarded by Ranghiano as hyphae of a symbiotic fungus [*R.A.M.*, xiii, p. 617] should rather be interpreted as artefacts produced by the precipitation and agglomeration of tannic substances, which are particularly abundant in vine tissues. This view is supported by the fact that in their own tests such bodies were readily stained by the reagents specific to tannic substances.

This investigation suggests the advisability of studying more closely the relationships between the abundance, distribution, and state of tannic substances in vine shoots, and the manifestation of court-noué symptoms, since Ranghiano stated that the endophytic hyphae described by him are particularly abundant in diseased shoots.

BONGINI (VIRGINIA). **Intorno ad una infezione di antracnosi della Vite.** [On an infection by Vine anthracnose.]—*Difesa Piante*, xii, 1, pp. 16–21, 1935.

In the summer of 1933, Siebel vines in a small vineyard in Piedmont were severely attacked by anthracnose (*Gloeosporium ampelophagum*) [*R.A.M.*, vii, p. 221; xiii, pp. 75, 148]. At the end of May and during June the young branches, fruit clusters, and leaves showed intense spotting; infection ceased during July and August, but became active again in September, a large number of cankers arrested in various stages of development remaining on the branches throughout the winter. Most of the lesions produced by the autumn attack were isolated and almost punctiform, others were almond-shaped, elongated in the direction of the axis, and showed a median ochraceous crack. In the large lesions, 3 or 4 cm. long, formed by the fusion of several smaller ones, spread of the infection was limited by newly-formed cork barriers which led to the desquamation of the older superficial tissues.

Hyaline, inter- and intracellular hyphae were present in the collenchyma near the affected parts, and in the phloem, xylem, and medullary rays. Sclerotia occurred at the edge of the larger lesions; the smaller lesions contained a few subcutaneous, punctiform, almost spherical, brown-walled, ostiolate loculi 200 μ in diameter by 150 μ high, lined with very thin sterigmata with ellipsoidal, hyaline stylospores, 3 to 5·3 μ in diameter. This pycnidial form (*Mangina ampelina*), observed by Viala and Pacottet in old cultures, is probably identical with that observed by M. R. Goethe in 1878. Since then it has only very occasionally been found in nature. Though of the *Phoma* type it was readily distinguishable macroscopically from *P. vitis* and *P. longispora* in that not more than two or three pycnidia were found in any one lesion, they were not present in all the lesions, and were absent from the largest ones, where the periderm tissue had usually peeled off carrying the pycnidial origins with it. It also differed microscopically from *P. vitis* and *P. longispora* in the shape and dimensions of the stylospores, which in the former are bacillary or ellipsoidal and in the latter much longer and either cylindrical or slightly curved.

Some recommendations for control are given.

WORMALD (H.). **Notes on plant diseases in 1934.**—*Rep. E. Malling Res. Sta. 1934*, pp. 142–147, 1935.

This account of plant diseases investigated at East Malling Research Station, Kent, in 1934 [*R.A.M.*, xiii, p. 681] contains, among others, the following items of interest.

Young Cox's Orange Pippin apple trees on No. II stock growing in various plantations in Essex became affected by a disease which in some cases killed them outright. The stems and branches were blistered, and showed the presence of *Coniothecium chomatosporum* [loc. cit.], but the trouble is considered to be largely of physiological origin.

In two plantations Charles Ross, Rival, Worcester Pearmain, and Grenadier apple trees showed a wilting of the leaves on certain branches, sometimes on isolated spurs, not immediately connected with any lesion. The wood of the affected branches was found to be discoloured down as far as a canker (caused by *Nectria galligena*), which, occasionally, was several feet distant from the affected foliage.

Spotting of pear leaves due to *Septoria piricola* (*Mycosphaerella sentina*) [ibid., xiv, p. 590] was recorded from Dorset; on some leaves more than 100 spots were present, many being confluent.

Myrobolan plums [*Prunus divaricata*] in Sussex showed cankers on the stems and young twigs, accompanied by a leaf spot; the bacterial organism associated with the condition has been isolated [cf. ibid., xiii, p. 710].

Black currant rust (*Cronartium ribicola*) was unusually prevalent, heavy infections occurring towards the end of summer. In one instance, Baldwin bushes were severely attacked while Davison's Eight immediately adjoining showed resistance.

Young fig shoots affected by *Botrytis cinerea* were killed back for about a foot; they bore the fructifications of the fungus towards the lower end of the diseased portion.

NOBLE (R. J.), HYNES (H. J.), MCCLEERY (F. C.), & BIRMINGHAM (W. A.). **Plant diseases recorded in New South Wales.**—*Sci. Bull. Dep. Agric. N.S.W.* 46, 47 pp., 1 map, 1935.

In this valuable publication over 1,260 plant diseases (other than sooty moulds, phanerogamous parasites, and conditions due to climatic agencies) found in New South Wales are listed under their respective hosts, with the date (where known) and locality of the first record. Diseases of major importance are indicated and very brief notes are given on a few of special economic significance; the work is completed by a useful index and a map.

BORG (P.). **Report of the Plant Pathologist.**—*Rep. Insp. Agric. Malta, 1933–34*, pp. 43–46, 1935.

The mis-statement recently issued in an Esthonian publication concerning the presence of potato wart (*Synchytrium endobioticum*) in Malta [*R.A.M.*, xiii, p. 799] may, it is thought, have been based on the interception and destruction in 1894 of consignments of seed potatoes reaching Valletta in a badly blighted and semi-rotten condition. Wart disease does not exist and is not known to have existed in the Maltese Islands.

Two reports of root rot (*Armillaria mellea*) on citrus [ibid., xiii, p. 81] were received during the year, 20 fruit trees being also attacked in one of the affected localities. Beneficial results again followed the application of iron sulphate to the roots.

Mild outbreaks of powdery and downy mildews of the vine (*Oidium tuckeri* [*Uncinula necator*] and *Peronospora* [*Plasmopara*] *viticola*) [ibid., ix, p. 158] were also recorded.

WADA (E.) & HUKANO (H.). **On the difference of X-bodies in green and yellow mosaic of Wheat.**—*Agric. & Hort.*, ix, pp. 1778–1790, 6 figs., 1934. (Japanese, with English summary.) [Abs. in *Jap. J. Bot.*, vii, 3–4, p. (64), 1935.]

The microscopic examination of a strip of the leaf epidermis of wheat plants in experimental plots attacked by yellow and green mosaic [*R.A.M.*, ix, p. 581; xii, p. 749] revealed the presence in the diseased tissues of two kinds of X-bodies, one vacuolate, oval or elongated, either larger or smaller than the nucleus of the host cell and occurring singly in each of the latter (A type), and the other homogeneous, oval or irregular, smaller than the foregoing and occurring in groups of two to three or up to five in one cell (B type). A blend of A and B types was observed in the cells of plants affected by both kinds of mosaic.

WATERHOUSE (W. L.). **Australian rust studies. V. On the occurrence of a new physiologic form of Wheat stem rust in New South Wales.**—*Proc. Linn. Soc. N.S.W.*, lx, 1–2, pp. 71–72, 1935.

After briefly referring to his earlier studies of wheat stem [black] rust (*Puccinia graminis tritici*) [*R.A.M.*, xiii, p. 621], the author states that in 1934 wheat from two centres in New South Wales was found to be attacked by form 11, which hitherto has not been recorded from Australia. Controlled work (as yet unpublished) at Sydney has shown

that physiologic form 34 is heterozygous [loc. cit.] and that the virulent form 11 is one of the forms which are frequently derived from it on inoculated barberries in the greenhouse. The recently reported discovery in the Central Tablelands of barberries naturally infected with form 34, which also occurred in the vicinity on graminaceous hosts, indicates the necessity of eradicating susceptible types of barberry. In March, 1935, form 11 was also found mixed with form 34 on *Agropyron scabrum* from the same locality.

CLARK (J. A.) & SMITH (G. S.). **Inheritance of stem-rust reaction in Wheat, II.**—*J. Amer. Soc. Agron.*, xxvii, 5, pp. 400–407, 1935.

The inheritance of three wheat stem [black] rust (*Puccinia graminis tritici*) reactions—near immunity, resistance, and susceptibility—has been further studied in hybrids in North Dakota [*R.A.M.*, xiii, p. 84]. Earlier crosses were interpreted as showing that Hope has a single dominant inhibiting factor for near immunity, Marquis and Reliance a major dominant factor for susceptibility, H–44 carries both these dominant factors, while the resistant Ceres carries the double recessives. Three further crosses between H–44 × Ceres (classified in F_3 as near immune) and the susceptible Marquis are interpreted on the same basis, such variations and inconsistencies as were noted being attributable with equal probability to environment as to additional modifying genetic factors. The rust genotypes of the H–44 × Ceres parents (C–6–1–2, C–6–21–1, and C–10–35–1) are postulated as IIss, resembling Hope; IISS, similar to H–44; and iiss, like Ceres, respectively. The rust reactions in cross No. 1 (IIss × iiSS) are controlled by the interaction of two major genetic factor pairs, the near-immune factor inhibiting that for susceptibility; those of No. 2 (IISS × iiSS) by the one near-immune factor pair; and those of No. 3 (iiss × iiSS) by the one susceptible factor pair. These results are thus in conformity with those obtained in previous studies.

CATALANO-GIAMBRA (ROSA). **Sulla germinazione delle teleutospore delle ruggini del Grano in Sicilia.** [On the germination of the teleutospores of Wheat rusts in Sicily.]—*Riv. Pat. veg.*, xxv, 3–4, pp. 113–116, 1 pl., 1935.

After briefly referring to the view expressed by Montemartini [*R.A.M.*, xiii, p. 18], among others, that the wheat rusts (*Puccinia triticina* and *P. glumarum*) prevalent in Sicily only form teleutospores very rarely and that these do not germinate, the author states that she succeeded in February, 1934, in germinating in hanging drops teleutospores of the rusts collected by her in Sicily in June, 1933, after submitting them to the physico-chemical treatments suggested by Sibilia [ibid., xi, p. 166]. The majority of the teleutospores germinated normally and produced sporidia.

PICHLER (F.). **Über die Verwendbarkeit von Wasserstoffsuperoxyd als Saatgutbeizmittel.** [On the applicability of hydrogen peroxide as a seed-grain disinfectant.]—*Phytopath. Z.*, viii, 3, pp. 245–251, 1935.

A tabulated account is given of the writer's laboratory and field

experiments to determine the utility of hydrogen peroxide for the control of wheat bunt [*Tilletia caries*: *R.A.M.*, xiv, p. 48], covered smut of barley [*Ustilago hordei*], and loose smut of oats [*U. avenae*]. Contrary to the results of Kisser and Portheim, the writer's tests gave no indication of adequate toxicity even at a strength of 3 per cent. (of the 30 per cent. solution) for wheat and barley and of 4 or 5 per cent. for oats.

CORNELI (E.). **Riproduzione in laboratorio di infezioni da 'Urocystis tritici' Koern. su Frumenti.** [Reproduction in the laboratory of infection by *Urocystis tritici* Koern. on Wheats.]—*Riv. Pat. veg.*, xxiv, 9–10, pp. 407–411, 1934. [Received July, 1935.]

Greenhouse tests with seed of Zara, Mentana, Virgilio, Rieti, and Gentil rosso wheat heavily inoculated with spores of *Urocystis tritici* [*R.A.M.*, xii, pp. 681, 751] resulted in 10·24, 2·5, 62·5, 5·0, and 13·15 per cent. infection, respectively. The first symptoms of attack were observed on Virgilio, but on all varieties infection developed within three months of sowing; growth was arrested and the plants gradually wilted and dried up without forming ears. As, under field conditions also (in 1933), Virgilio showed the heaviest, and Mentana the lightest, infection, the author concludes that Mentana, Zara, Rieti, and Gentil rosso are naturally highly resistant and Virgilio susceptible.

No infection was shown by any plant grown in the greenhouse from seed inoculated and then treated with Caffaro powder or copper sulphate solution (1 per cent. for 30 mins.) followed by milk of lime.

RĂDULESCU (E.). **Untersuchungen über die physiologische Spezialisierung bei Flugbrand des Weizens Ustilago tritici (Pers.) Jens.** [Studies on physiologic specialization in loose smut of Wheat *Ustilago tritici* (Pers.) Jens.]—*Phytopath. Z.*, viii, 3, pp. 253–258, 1935.

The results of tests with seven Rumanian collections of loose smut of winter wheat (*Ustilago tritici*) on five standard varieties indicated (unless perhaps the test varieties were too few or not suitable) the absence of physiologic forms of the smut [*R.A.M.*, xiii, p. 621], the hereditary constitution of the varieties grown in Rumania probably not favouring their development. Marked specialization was shown, on the other hand, by eight collections from summer wheat in Rumania and two foreign collections when tested on twelve (seven standard assortment) summer wheat varieties. The eight Rumanian collections fell into three physiologic forms, viz., 1, the most common, from four localities, severely attacking Stephany 71, Saumur de Mars, Peragis, Vesny, and Blue Ribbon but sparing Rimpaus Red Schlanstedt and Hohenheimer 25f; 2, causing moderate to severe infection of Red Schlanstedt, Peragis, and Vesny, slightly attacking Hohenheimer 25f, Saumur de Mars, and Blue Ribbon, and sparing Stephany 71; and 3, from Jassy only, characterized by an extremely low degree of virulence, attacking none of the test varieties and very slightly infecting one other (Ghirca). Of the two foreign strains, that from Halle agrees with Grevel's form 1 [ibid., ix, p. 708], which is apparently absent from Rumania, while the Czecho-Slovakian also differs from the three Rumanian forms, attacking Stephany 71 mildly, Saumur de Mars and

Blue Ribbon moderately to severely, and sparing Red Schlanstedt, Hohenheim 25f, and Peragis; it may be designated as form 4. The Rumanian forms 1, 2, and 3 appear to correspond with Grevel's 2, 3, and 4, respectively. Of the varieties outside the standard assortment used in the trials, Black Persian was remarkable for its high degree of resistance and Rümkers Squarehead for its immunity, both these being suitable for use as parents. Hohenheimer 25f was the most resistant of the standard varieties, Peragis and Saumur de Mars the most susceptible.

Glynne (Mary D.). **Incidence of take-all on Wheat and Barley on experimental plots at Woburn.**—*Ann. appl. Biol.*, xxii, 2, pp. 225–235, 1 graph, 1935.

The results of investigations in 1931, 1932, and 1933 into the incidence of the take-all disease (*Ophiobolus graminis*) [see next abstracts] in the continuous wheat and barley growing experiments at the Woburn Experimental Station showed that there was little or no take-all in plots which had received ammonium sulphate alone or in combination with minerals or with 1 to 2 tons lime per acre prior to 1926, since when all the plots, with the exception of some under barley, had remained unmanured. In most of the other plots the disease was present in varying amounts, the percentage infection being usually higher in wheat (reaching 52·5 per cent. in one plot) than in barley (maximum 16·2 per cent.). Little or no take-all occurred either in wheat or barley on soils with a P_H value of 5 or less, comparatively little at 5·1, and in general considerably more at higher values. In wheat the general tendency, in spite of wide variations at the same P_H values, was for the percentage infection to rise as the hydrogen ion concentration decreased, but this was not apparent in barley. A wheat plot which had received applications of rape dust was exceptional in that it showed little infection although it had a P_H value of 5·4, suggesting a possible controlling effect of the dust on take-all. No clear relationship between incidence of the disease and yield of the plots could be established.

The three years' observations suggested that the incidence of take-all in wheat plots increases gradually until 35 per cent. of the plants are infected, from which point it decreases, while two years' observations of barley plots suggested that the corresponding figure for this crop is about 10 per cent. The average loss in yield due to the disease in 13 affected plots rose from 16 per cent. in 1931 to 20 per cent. in 1933, with a maximum of 42 per cent. Take-all was very much less in wheat grown in alternate years with a green manure crop intervening than in continuous wheat plots.

A white mycelium belonging to an Agaric of the *Cortinarius* type was frequently found on the roots and basal parts of wheat and barley. While in general it did not appear to be parasitic, there was some evidence that in certain plots it had become so, causing a loss in yield of 37 per cent.

Hynes (H. J.). **Studies on Helminthosporium root-rot of Wheat and other cereals. Part 1. Economic importance, symptoms and causal organisms. Part 2. Physiologic specialisation in Helminthosporium spp.**—*Sci. Bull. Dep. Agric. N.S.W.* 47, 39 pp., 4 pl., 1 graph, 1935.

The author states that his further studies of the cereal root rot

problem in New South Wales [*R.A.M.*, xi, p. 503] showed that the principal fungi associated with the condition there are *Fusarium culmorum*, *Ophiobolus graminis*, *Rhizoctonia* [*Corticium*] *solani*, and species of *Helminthosporium* including *H. sativum*, *H. tetramera* (but identified by K. B. Boedijn, to whom an isolation was sent, as *Curvularia* [ibid., xiii, p. 475] *spicifera* (Bainier) Boedijn), and *Helminthosporium M* [ibid., iv, p. 408] to which Boedijn has assigned the name *C. ramosa* (Bainier) Boedijn. All these organisms cause appreciable losses in wheat annually, those in 1931 having been estimated at over £362,000. A three-year survey indicated that take-all caused by *O. graminis* is probably more important than foot rot attributed to various species of *Helminthosporium*, but the latter at times also cause a serious wheat seedling blight, resulting in thin stands and reduced yields. A comparative study of the symptoms caused by *O. graminis*, *H. sativum*, and *H. tetramera* on cereals grown from surface-sterilized, inoculated seed in sterilized soil showed that the plants infected with *O. graminis* differed in several characters from those attacked by *Helminthosporium*, the latter exhibiting, *inter alia*, increased tillering and tan discolorations of the stem bases in contrast to reduced tillering and blackish markings in the former. It is suggested that the field symptoms attributed to *Helminthosporium* [ibid., xi, p. 503] are probably the result of the activity of more than one organism.

In the second part of this paper the author describes comparative specialization studies of *H. sativum*, *H.M*, and *H. tetramera*, the results of which showed the existence of 31 physiologic forms of *H. sativum*, 11 of *H.M*, and 5 of *H. tetramera*, differing in their cultural behaviour on potato dextrose, maize meal, and prune juice agars at temperatures of 15° and 25° C. Saltation was observed in certain isolates of each species, especially at 25°. Pathogenicity tests indicated that *H.M*, as a group, is more virulent than either *H. sativum* or *H. tetramera*, although the severity of infection varied considerably in each species, and even within a single physiologic form in the case of *H. sativum* and *H.M*. No correlation was observed between degree of virulence and rate of growth of the organisms in pure culture, and it is suggested that the infection capabilities of a mass collection of cultures cannot be predicted from the behaviour of the organisms on agar media.

PADWICK (G. W.). **Influence of wild and cultivated plants on the multiplication, survival and spread of cereal foot-rotting fungi in the soil.**—*Canad. J. Res.*, xii, 5, pp. 575–589, 1935.

Continuing his studies of the cereal root rot problem in Canada [*R.A.M.*, xii, p. 621], the author gives a brief, tabulated account of pot experiments, in which he shows that susceptible grasses, such as *Agropyron tenerum*, *A. cristatum*, *A. repens*, and *Bromus inermis* tend to promote the survival and accumulation of the take-all fungus (*Ophiobolus graminis*) [see preceding abstracts] in both unsterilized and sterilized soil. These results, supported by field observations, indicate that susceptible species of grasses should be avoided or used sparingly in rotation schemes aiming at the control of take-all, and that summer fallows which do not include a strict eradication of *A. repens* cannot be expected to solve the problem, and may even intensify it. There was

sufficient evidence to show that the same grasses also increased the prevalence of *Helminthosporium sativum* in sterilized soils. The *Agropyron* species did not appear to increase appreciably the incidence of *Fusarium graminearum* [*Gibberella saubinetii*: ibid., xiv, p. 503], but *B. inermis* may be of importance from this standpoint. There is no evidence so far that resistant or immune species actually serve to reduce the quantity of root-rotting fungi in the soil.

The results of further controlled experiments in wooden boxes showed that *O. graminis* was unable to spread laterally to any appreciable extent in bare, unsterilized, black loam soil, but was able to do so to a considerable distance in the presence of living, susceptible plants.

Stening (H. C.). **Effect of 'black point' disease on the germination of Wheat.**—*Agric. Gaz. N.S.W.*, xlvi, 5, p. 282, 1935.

Comparative tests made in New South Wales in three different years of the germinative capacity of healthy wheat grain and that affected by black point [*Helminthosporium sativum* and *Alternaria*: *R.A.M.*, xiii, p. 759], showed that the condition reduced germination by approximately 5½ per cent. The disease has recently been present in nearly all the wheat-growing areas of the State.

Aamodt (O. S.) & Johnston (W. H.). **Reaction of Barley varieties to infection with covered smut (Ustilago hordei [Pers.] K. & S.).**—*Canad. J. Res.*, xii, 5, pp. 590–613, 1 fig., 1935.

After a brief note on the economic importance of barley covered smut (*Ustilago hordei*) in Canada, the authors give a tabulated account of field varietal resistance tests in 1931 (with hulled seed), 1932 (with seed dehulled with sulphuric acid) [*R.A.M.*, xiv, p. 158], and 1934, the last series being performed with seed dehulled by hand (removing the hull over the embryo region with a scalpel), by scarification (rubbing the seed between two sheets of sandpaper of medium coarseness), and by concentrated sulphuric acid. The results, which were analysed by statistical methods, showed that infection of hulled seed was too poor and uncertain to give reliable data on varietal reaction to the disease. All the three dehulling methods gave a significant increase in the amount of resulting smut, the highest infection being given by the hand-dehulled seed and the least by the scarified seed. The average percentage stands of the different varieties tended to be directly proportional to, and the average percentage smut infection inversely proportional to, the amount of hull remaining on the grains following acid treatment. This treatment, as well as scarification, delayed heading by 1½ and 2½ days, respectively, as compared with plants grown from hulled or hand-dehulled seeds, and, moreover, it caused seedling injury to certain varieties. There was a tendency for the later varieties to be more susceptible to the smut than the earlier ones.

The barley varieties tested differed greatly in their reaction to covered smut, but a fair degree of correlation was found between the varietal infection percentages obtained in 1932 with acid-dehulled seed and those obtained in 1934 with hand- or acid-dehulled seed. The experiments indicated that ten six-rowed, hulled types (including O.A.C. 21, Atlas, Sacramento, Glabron, Velvet), three two-rowed, hulled types (Spartan,

Golden Pheasant, Horn), and five hull-less types (Himalayan, New Era, Russian, Mongolian, Burbank) are resistant to the smut, two distinct physiologic forms of which [cf. ibid., iv, p. 214] were found in collections gathered from six centres in central Alberta.

Ronsdorf (Liselotte). **Weitere Untersuchungen über den Nachweis biologischer Rassen des Gerstenzwergrostes, Puccinia simplex Erikss. et Henn.** [Further investigations on the determination of biologic strains of the Barley dwarf rust, *Puccinia simplex* Erikss. et Henn.]—*Phytopath. Z.*, viii, 3, pp. 237–243, 1935.

Five physiologic forms of dwarf [brown] rust of barley (*Puccinia simplex*) [*P. anomala*] occurring in Germany, viz., II, III, IV, V, and IX, were tested for their behaviour on 15 of the 17 varieties used by Mains as a standard for this purpose in the United States [*R.A.M.*, x, p. 231; xiii, p. 760]. From the results [which are discussed and tabulated] of the experiments it was evident that temperature is an important factor in varietal reaction to *P. anomala*, which on some varieties, e.g., Quinn (resistant), Callas, Peruvian, Bolivia, and Juliaca, tends to be more virulent at 12° than at 22° C., whereas Arequipa and Mecknos Meroc are more resistant at a lower temperature.

The five physiologic forms used in the tests showed very slight differences and behaved like a single on Mains's standard varieties; they were distinct, however, from the two forms already described by him. It would thus have appeared that only three forms of *P. anomala* exist, but by the use of Hey's standard assortment [ibid., xi, p. 36] the five forms were clearly differentiated. The latter is therefore preferable for the determination of physiologic specialization in brown rust of barley. Three monospore cultures of *P. anomala* from the United States were tested on Hey's assortment and shown to differ not only from each other but also from the German forms.

Honecker (L.). **Weitere Mitteilungen über das Vorkommen biologischer Rassen des Gersten-Meltaues (Erysiphe graminis hordei Marchal), ihre Verbreitung in Deutschland und die sich daraus ergebenden Richtlinien für die Immunitätszüchtung.** [Further notes on the occurrence of biological forms of Barley mildew (*Erysiphe graminis hordei* Marchal), their distribution in Germany, and the lines on which breeding for immunity should be conducted.]—*Züchter*, vii, 5, pp. 113–119, 1935.

After referring to his earlier paper on specialization in barley mildew (*Erysiphe graminis hordei*) [*R.A.M.*, xiv, p. 92] the author briefly describes inoculation experiments in 1934 on three selected standard varieties [loc. cit.], the results of which showed the occurrence in Germany, besides the two physiologic forms A and B previously recorded, of a third form C, characterized by high virulence to the Dalmatian Ragusa variety (which is immune from the other two forms) and to the other two test varieties. So far it has only been isolated from material sent in from the district Irlbach in Bavaria, while the other two forms are widespread over the whole of Germany, B occurring mostly as a slight admixture to A and being most frequent in north, west, and south Germany, Austria, and Rumania. Pathogenicity

tests on a wide range of malting and fodder barley varieties indicated that almost all the varieties immune from form A are highly susceptible to form B, while varieties highly susceptible to both forms A and B exhibit moderate to average susceptibility to form C, the severity of infection by this form depending in a large measure on environmental conditions. Varieties moderately susceptible to forms A and B are also moderately susceptible to form C, with a general tendency for their susceptibility to the last-named to be rather lower than to the other two forms.

The paper terminates with a consideration of the bearing of these results on the possibility of breeding barley varieties resistant to all three forms of *E. g. hordei.*

Murphy (H. C.). **Effect of crown rust infection on yield and water requirement of Oats.**—*J. agric. Res.*, l, 5, pp. 387–411, 4 figs., 6 graphs, 1935.

This is a full, tabulated account of the author's greenhouse experiments in Iowa in 1928, 1930, and 1933, on the relation of crown rust (*Puccinia coronata avenae*) [*P. lolii*] infection to yield and water requirement of resistant and susceptible oat varieties, a preliminary report of which has been noticed [*R.A.M.*, xiv, p. 353]. In addition to the information already given, the results showed that the effect of the rust on photosynthesis, date of ripening, total yield, and water requirement of both susceptible and resistant plants varied with the degree and type of infection, the stage of growth of the host, and the duration of infection. Apart from reducing the yield of grain [loc. cit.], due to the production of fewer and lighter kernels, and to a higher percentage of hulls in the grain, rust infection also affected root production. In 1930, with 100 per cent. infection, the ratio of roots to straw of the susceptible Markton selection was reduced from 22·8 per cent. for the rust-free plants to 2·8 per cent. for the plants that had been inoculated in the seedling stage, while the corresponding reduction for the resistant Victoria selection was from 31·8 to 16·9 per cent. Susceptible plants inoculated at the same stage used 290·8 per cent. more water per unit of dry weight than rust-free controls, whereas the water requirement of inoculated resistant plants was only increased by 39·9 per cent. In comparative tests it was shown that rust infection tended to have a greater effect on the yield and water requirement of the susceptible plants at the higher than at the lower soil moisture content, while on the nearly immune Bond selection the effect was greater at the lower soil moisture. The lower soil moisture of itself significantly reduced the yield of all plant parts but also decreased the water requirement of both rusted and rust-free plants.

Nieves (R.). **Infección experimental del Centeno de Petkus (Secale cereale v. vulgare), por las caries del Trigo : Tilletia tritici y Tilletia levis.** [Experimental infection of Petkus Rye (*Secale cereale* v. *vulgare*) by the Wheat bunts: *Tilletia tritici* and *Tilletia levis.*]—*Phytopathology*, xxv, 5, pp. 503–515, 1935. [English summary.]

During the years 1931–3 the writer successfully inoculated Petkus rye with certain physiologic forms of wheat bunt (*Tilletia tritici* and

T. levis) [*T. caries* and *T. foetens*] collected from various parts of Argentina [*R.A.M.*, xii, p. 683], where the rare *T. secalis* [ibid., xii, pp. 549, 616] does not appear to occur.

The seed-grain was dusted shortly before planting with the spores of the particular bunt collection under investigation. In 1931–2 six collections of *T. caries* and two of *T. foetens* were used and the sowings were made on 23rd April and 20th July. From the first, 68 infected spikelets were found among a total of 6,761 (about 1 per cent.), the corresponding figures for the second sowing being only 2 out of 8,667 (0·02 per cent.). Three of the collections of *T. caries* and one of *T. foetens* produced infection. In 1932–3, 18 collections of the former species and 6 of the latter were used, the seed being sown on 27th April. Forty-nine diseased spikelets were found among 23,780 examined (0·22 per cent.), the average infection for the two years being 0·3 per cent. (119 diseased spikelets out of 39,208). Four collections of *T. caries* and three of *T. foetens* gave positive results. In 1933–4, 43 collections of *Tilletia*, all indigenous except one from Germany, were tested with positive results (awaiting further confirmation) on 11 different hosts.

As a result of tests of the various bunt strains on differential wheat varieties 9 physiologic forms of *T. caries* (I to IX) and 4 of *T. foetens* (I to IV) have been established [ibid., xiii, pp. 85, 86, 359] for the Argentine, of which only 3 of the former (II, V, and IX) and all the latter were pathogenic to rye.

HOPKINS (J. C.). **Suspected 'streak' disease of Maize. Notice to growers.** —*Rhod. agric. J.*, xxxii, 4, pp. 234–236, 1 pl., 1935.

Maize in Rhodesia is reported recently to have become affected with a disease closely resembling streak [*R.A.M.*, xiv, p. 146]. The symptoms of streak disease are described, and growers are asked to send specimens and reports to the author, in order that the distribution of the condition in the Colony may be ascertained. Experiments in insect transmission are in progress.

RHOADES (VIRGINIA H.). **The location of a gene for disease resistance in Maize.**—*Proc. nat. Acad. Sci., Wash.*, xxi, 5, pp. 243–246, 1 fig., 1935.

Particulars are given of a study on the chromosomal location in maize of the factor for resistance to physiologic form 3 of *Puccinia sorghi* [*P. maydis*: *R.A.M.*, xi, p. 170], which was cytologically determined by means of X-ray-induced deficiencies (Barbara McClintock's method described in *Bull. Mo. agric. Exp. Sta.* 163, 1931) and genetically checked by means of trisomic ratios.

Pollen from a plant homozygous for the dominant factor for resistance was treated with X-rays (1,000 or 2,000 *r* units) and then used to pollinate susceptible plants. The seed thus obtained was grown in the greenhouse during the winter, the resultant F_1 seedlings inoculated with the rust, and the susceptible individuals (which were readily distinguishable by their reactions from the resistant ones) cytologically examined at the mid-prophase of meiosis. The results of this examination, supplemented by those of a genetic study of trisomic ratios [which are tabulated], indicate that the factor for resistance to *P. maydis* form 3 is

situated in the short arm of the tenth and shortest chromosome of the haploid maize complement.

Briton-Jones (H. R.) & Baker (R. E. D.). **Control of Grapefruit diseases by cultural methods in Trinidad.**—*Trop. Agriculture, Trin.*, xii, 5, pp. 119–125, 4 pl., 1935.

In this paper, the purpose of which is to inform planters as to the best means of avoiding disease in new plantations of grapefruit, the authors give brief notes on the environmental conditions that favour the development of parasitic and other troubles in Trinidad, namely, damping-off of seedlings due, presumably, to various fungi, among which *Phytophthora parasitica* was identified in one case; scab (*Sporotrichum citri*) [*R.A.M.*, xiii, p. 219]; gummosis (*P. parasitica* and *P. palmivora*) [ibid., xiv, p. 505]; root rot, the causal organism of which has not been discovered so far; threadblights (*Corticium stevensii* and as yet unidentified Marasmioid forms) [ibid., xiii, p. 540]; *Septobasidium* sp. believed to be probably *S. pseudopedicillatum* [loc. cit.]; and pink disease (*C. salmonicolor*): the three last-named diseases are of minor importance.

Webber (Irma E.) & Fawcett (H. S.). **Comparative histology of healthy and psorosis-affected tissues of Citrus sinensis.**—*Hilgardia*, ix, 2, pp. 71–93, 7 pl., 1935.

This is a full account of the authors' comparative studies of the tissues of healthy and of psorosis-affected orange trees [*R.A.M.*, xiii, p. 692], the results of which showed that the first symptom of the disease in the stem is an abnormal darkening of the parenchyma cell contents in the cortex; this is followed by the formation of an underlying phellogen layer which differentiates cork centrifugally and phelloderm centripetally. The phelloderm thus produced is much more abundant than that laid down in healthy stems, and at times contains radially arranged groups of small stone cells. This process results in the formation of small macroscopically visible eruptions on the surface of the bark, and as the disease progresses it involves further groups of parenchyma cells deeper down in the cortex. In time the tissues over the abnormal cork slough off in scales, which are the most conspicuous symptom of the trouble. Diseased xylem is characterized by concentric rings or partial rings of vertical gum ducts and by scattered vessels plugged with gum, which also occurs occasionally in gum pockets in the abnormally thick phelloderm. Gum is often visible externally on affected stems.

Psorosis-affected leaves, in which the mesophyll is not yet completely differentiated, exhibit a mosaic-like effect [loc. cit.] due to small light-coloured areas in the lamina; the tissues of such leaves differ from those of normal leaves in their staining reactions, and sections through the irregular, discoloured, and corky areas, which often appear on mature diseased leaves, show an abnormal darkening of epidermal and occasionally mesophyll cells, under which a cork layer is formed.

The results of these studies, which failed to reveal any visible causal organism, tend to confirm Fawcett's suggestion [loc. cit.] that psorosis may be caused by a virus. There was some evidence that the development of the disease may be accelerated by environmental conditions.

Reed (H. S.) & Dufrénoy (J.). **The effects of zinc and iron salts on the cell structure of mottled Orange leaves.**—*Hilgardia*, ix, 2, pp. 113–137, 2 col. pl., 11 figs., 1935.

Continuing their studies of the mottle leaf disease of citrus [*R.A.M.*, xiv, p. 506] the authors give details of experiments, the results of which showed that the recovery of mottled trees after the application of zinc salts either through the soil or as a foliage spray is associated with profound cytological changes, the beneficial effects being especially striking in old depauperate leaves sprayed with a solution of zinc sulphate. Neither calcium deficiency nor phloem necrosis is exhibited by the green leaves that develop on shoots produced after treatment, and their chloroplasts develop to a fair size. The action of iron salts, on the other hand, appeared to be negligible.

The investigation also indicated that definite information as to the distribution of iron and zinc in leaves and buds may be obtained by a combination of micro-incineration and micro-analysis, and there was further evidence to support the view that zinc is intimately concerned with the oxidation-reduction potential of the cell [ibid., xiv, p. 302].

Haas (A. R. C.) & Quayle (H. J.). **Copper content of Citrus leaves and fruit in relation to exanthema and fumigation injury.**—*Hilgardia*, ix, 3, pp. 143–174, 9 figs., 1935.

The results of the investigation reported in considerable detail in this paper showed that the leaves of citrus trees affected with exanthema [*R.A.M.*, xi, p. 105] have a lower copper content than normal, and that the same is probably also true of the fruit. By means of controlled sand cultures it was further shown that the disease appears in soils deficient in copper.

Robson (G.). **Mould wastage in Citrus fruits.**—*Food Manuf.*, x, 5, pp. 159–161, 7 figs., 1935.

In this paper on the etiology and control of mould spoilage in citrus fruits promising results are stated to have been obtained in California with 'agene' (nitrogen trichloride) gas [*R.A.M.*, xiv, p. 163] as a means of combating *Penicillium digitatum*, *P. italicum*, *Phytophthora citrophthora* (mycelium), *Colletotrichum gloeosporioides*, and *Alternaria citri*. The gas is ordinarily effective at a concentration of 4 to 6 mg. per cu. ft. for 30 minutes, but at this low strength it is not lethal to large clumps of mycelium. During eight to ten weeks' storage, decay in oranges may be reduced by 50 to 75 per cent. by fumigation with nitrogen trichloride at 15 mg. per cu. ft. Three to five three-hour treatments at three- to four-day intervals should be given. For commercial purposes it is advisable to prolong the first treatment to six hours to ensure penetration to the centre of the box, and to maintain the fungicidal action for a sufficiently lengthy period.

Neal (D. C.) & Gilbert (W. W.). **Cotton diseases and methods of control.**—*Fmrs' Bull. U.S. Dep. Agric.* 1745, 34 pp., 27 figs., 1935.

After stating that their observations lead them to believe that disease reduces the American cotton crop by over two million bales a year, the

authors give brief, popular notes on the symptoms, cause, and control of the following major diseases of this host found in the United States: root rot (*Phymatotrichum omnivorum*) [*R.A.M.*, xiv, pp. 304, 443], wilt (*Fusarium vasinfectum*) [ibid., xiii, p. 766; xiv, p. 359], *Verticillium* wilt (*V. albo-atrum*) [ibid., xiii, p. 632], anthracnose (*Glomerella gossypii*) [ibid., x, p. 240; xiii, p. 804], bacterial blight (*Bacterium malvacearum*) [ibid., xiv, p. 304], potash hunger or 'rust' [ibid., xiii, p. 698], crazy top or acromania [ibid., vii, p. 96], associated with unsatisfactory soil and cultural conditions, magnesium deficiency, sore shin (*Corticium solani*) [ibid., xii, p. 566], *Ascochyta* blight (*A. gossypii*) [ibid., ix, p. 240], and lightning injury. The minor diseases dealt with include leaf blight (*Alternaria* sp.) [ibid., xi, p. 225], *Cercospora* leaf spot (*C. gossypina*) [ibid., ix, p. 32], areolate mildew (*Ramularia* [*Mycosphaerella*] *areola*) [ibid., xi, p. 512], the boll rots due to *Diplodia gossypina* [ibid., x, p. 240; xii, p. 366], *Fusarium* spp., chiefly *F. roseum* and *F. moniliforme* [*Gibberella moniliformis*: ibid., xi, p. 453], *Aspergillus niger*, and *Rhizopus nigricans*, and true rusts caused by *Kuehneola gossypii* [*Cerotelium desmium*: ibid., xi, p. 475] and *Puccinia hibisciata* (*P. schedonnardi*) [ibid., xiv, p. 348]; the former rust, found in Cuba, Porto Rico, and (once) in Florida, causes slightly raised, rust-brown, circular, pinhead spots on the leaves, whereas the latter, which occurs to a limited extent in Texas, Arizona, New Mexico, and southern California, produces larger, raised, orange-coloured spots on the leaves, bolls, and involucral bracts.

Viegas (A. P.) & Krug (H. P.). **A murcha do Algodoeiro.** [Cotton wilt.] —*Rev. Agric. S. Paulo*, x, 1–2, pp. 49–51, 3 figs., 1935.

This is a very brief account of the cotton wilt caused by *Verticillium albo-atrum* [see preceding abstract], which was found in 1933 occurring in considerable abundance in several centres of São Paulo, Brazil, causing appreciable economic losses to the crop. Work is in hand to test the possibility of controlling the disease by growing resistant cotton varieties.

Boczkowska (Marie). **Contribution à l'étude de l'immunité chez les chenilles de Galleria mellonella L. contre les champignons entomophytes.** [A contribution to the study of immunity in larvae of *Galleria mellonella* L. from attack by entomogenous fungi.]—*C.R. Soc. Biol., Paris*, cxix, 16, pp. 39–40, 1935.

When wax-moth (*Galleria mellonella*) larvae were infected by entomogenous fungi (the most virulent of which were *Beauveria bassiana* [*R.A.M.*, xiv, p. 441] and *Metarrhizium anisopliae* [ibid., xiii, p. 94]) in many instances black spots consisting of agglomerated leucocytes formed on the chitin, the hypoderma became detached and degenerated, and blood passed between it and the chitin, the blood cells forming a sort of abscess in the space left by the hypoderma under the chitin. In severe infections the black chitin ruptured and the fungus penetrated the tissues. The blood reacted to infection by the formation of giant cells; the fungi escaped intracellular digestion by the leucocytes owing to their rapid growth.

Injections of spore emulsions were more rapidly fatal than external inoculations with the same emulsions, while the latter method caused

infection more rapidly than dusting with dried spores. Negative results have so far been obtained from attempts to induce immunity.

Marchionatto (J. B.). **Argentine Republic : fungous parasites of scale insects of fruit trees.**—*Int. Bull. Pl. Prot.*, ix, 5, pp. 102–103, 1935.

Notes are given on some important fungal parasites of scale insects infesting fruit trees in Argentina, all of which have been mentioned in a recent list [*R.A.M.*, xiv, p. 98] with the exception of *Septobasidium albidum* [ibid., xiii, p. 90] on the citrus pest, *Lepidosaphes beckii*.

Léger (L.) & Gauthier (Marcelle). **La spore des Harpellacées (Léger et Duboscq), champignons parasites des insectes.** [The spore of the Harpellaceae (Léger & Duboscq), fungi parasitic on insects.] —*C.R. Acad. Sci., Paris*, cc, 17, pp. 1458–1460, 1935.

The spores of the Harpellaceae [*R.A.M.*, xii, p. 511] (a term considered preferable to 'conidia' in the present state of knowledge of this group) are stated to be uniformly exogenous, thick walled, transparent, refringent, and of a fair size (30 to 50 μ); they are acrogenous, ordinarily unilateral, and their growth rate increases parallel with their proximity to the apex of the axis or branch on which they are borne. The shape of the spores varies with the genera, the most common being the ovoid-elongated, more or less swollen type characteristic of *Stachylina* and *Genistella*; those of *Stipella* and *Typhella* (a new genus parasitic on Chironomid larvae to be described in the near future) are tubular, rectilinear, or slightly curved, 38 by 5 μ; in *Orphella* they are banana- and in *Harpella* crescent-shaped. On detachment from their axes the helical filaments attached to the spores uncoil and reach remarkable lengths—up to six times that of the spores themselves (in *G. ramosa*). The function of these remarkable appendages is obscure, but since they are not generally present in the spores occurring freely in the intestines of the hosts, they are evidently short-lived.

Nobindro (U.). **Grass poisoning among cattle and goats in Assam.**—*Indian vet. J.*, x, 3, pp. 235–236, 1934.

During July and August 1932, cattle and goats in Assam were affected by symptoms indistinguishable from those of ergot poisoning (*Claviceps*) [*purpurea*]. Search of the grazing fields revealed the presence of a species of *Balansia* in abundance on lovethorns grass [?*Andropogon aciculatus*] and the trouble is attributed to poisoning from this fungus. A good number of cattle and goats are said to die from this cause every year in India.

Redaelli (P.). **La moderna sistemazione delle cosidette 'blastomicosi'.** [The modern taxonomy of the so-called 'blastomycoses'.]—*G. ital. Derm. Sif.*, lxxvi, 2, pp. 253–281, 5 pl., 1935.

Following some general observations on the classification of human mycoses and a consideration of the significance of the terms 'blastomycetes' and 'blastomycoses', the use of which is deprecated as misleading, the writer passes in review the various schemes proposed for the subdivision of this heterogeneous group of human pathogens. The conclusion is reached that the separation of the latter into etiologically,

clinically, and anatomically well-defined forms is essential. On this basis ten types of disease are differentiated, viz. (1) rhinosporidial granuloma (*Rhinosporidium seeberi*) [*R.A.M.*, xiv, p. 446]; (2) coccidioidal granuloma (*Coccidioides immitis*) [ibid., xiv, p. 445]; (3) paracoccidioidal granuloma (*Paracoccidioides brasiliensis*) [ibid., xiv, p. 169]; (4) chromomycotic verrucose dermatitis (*Trichosporium pedrosoi*) [ibid., xiv, p. 509]; (5) Gilchrist's syndrome or mycotic verrucose dermatitis (*Gilchristia dermatitidis*) [ibid., xiv, p. 582]; (6) Darling's disease (*Histoplasma capsulatum*) [or *Posadasia capsulata*: ibid., xiv, p. 583]; (7) epizootic lymphangitis (*H. farcinimosum*) [*Cryptococcus farcinimosus*: loc. cit.]; (8) splenomegaly of rats (*H.* [*C.*] *muris*) [loc. cit.]; (9) highly variable forms, including ringworms (*Trichophyton* and other fungi) and the superficial or internal disturbances associated with *Candida* and other genera; and (10) miscellaneous pathological conditions not assignable to any of the preceding categories and requiring individual examination.

Sartory (A.), Sartory (R.), Meyer (J.), & Weiss (R.). **Étude d'un champignon levuriforme nouveau isolé d'une dermatomycose tropicale.** [A study of a new yeast-like fungus isolated from a tropical dermatomycosis.]—*Bull. Acad. Méd. Paris*, cxiii, 15, pp. 486–488, 1935.

From the squamae of superficial, circinate, localized lesions on negro patients at Dr. A. Schweitzer's hospital, Lambaréné (French Equatorial Africa), the writers isolated a species (believed to be new to science) of *Blastodendrion* [*R.A.M.*, xiii, p. 767] to which the name *B. schweitzeri* n.sp. is given [without a diagnosis].

The colonies formed by the organism on various standard solid media are of a smooth, creamy consistency, readily detachable from the substratum, and yellowish-white in colour (turning brown after a month on Sabouraud's malt agar only). The optimum temperature for growth was found to be 27° to 28° C. Among liquid media, peptonized water proved the most satisfactory. Milk was coagulated in four days and peptonized in nine. The 'veil' formed on peptonized water was found to consist of a very loosely woven mycelium with stalagmoid, very occasionally verticillate blastospores, 12 to 16 by 4 to 6 μ. Positive results were given by inoculation experiments on guinea-pigs.

Downing (J. G.) & Hazard (J. B.). **Cutaneous moniliasis associated with oral thrush. An unusual case.**—*Arch. Derm. Syph., Chicago*, xxxi, 5, pp. 636–643, 3 figs., 1935.

Clinical particulars are given of a case of cutaneous moniliasis associated with oral thrush in a 15-year-old white boy at the Boston City Hospital. The organisms isolated on Sabouraud's maltose agar and plain bouillon at 37·5° C. from the lesions of the mouth and face were yeast-like, with round to oval cells, 5 to 10 μ in diameter, septate hyphae, and oval conidia, 2 to 5 μ in diameter. After seven days' incubation at room temperature a typical inverted 'pine tree' mycelium developed, the long hyphae bearing at regular intervals spherical clusters of 20 to 30 conidia. The colonies were round, slightly conical, smooth, and ivory-white. The fungus is considered to be allied to

Monilia [*Candida*] *albicans* [*R.A.M.*, xiv, p. 444], which is not usually present on normal skin. Inoculation experiments on rabbits gave positive results.

Wieder (L. M.). **Fungistatic and fungicidal effects of two wood-preserving chemicals on human dermatophytes: ortho (2 chlorophenyl) phenol sodium and tetrachlorphenol sodium.**—*Arch. Derm. Syph., Chicago*, xxxi, 5, pp. 644–657, 1935.

Full particulars, accompanied by tables, are given of the methods and results of the writer's experiments in the control of the dermatophytes, *Trichophyton interdigitale* (five strains), *T. gypseum granulosum* [*R.A.M.*, x, p. 29], *Sporotrichum schenckii* [ibid., xiv, p. 36], and *Monilia* [*Candida*] *albicans* [see preceding abstract] by the wood preservatives, sodium-2-chloroorthophenylphenolate and sodium tetrachlorophenolate [ibid., xii, p. 668]. Both in dextrose broth and Sabouraud's agar cultures in the laboratory and in subsequent clinical practice the latter proved the more effective of the two, exerting a definite action on the superficial forms of dermatophytosis when applied as an ointment at a strength of 1 per cent. by weight.

Moore (M.) & Kile (R. L.). **Generalized, subcutaneous, gummatous, ulcerating sporotrichosis: report of a case with a study of the etiologic agent.**—*Arch. Derm. Syph., Chicago*, xxxi, 5, pp. 672–685, 6 figs., 1935.

An account is given of a case of generalized sporotrichosis in a 50-year-old white woman, associated with an organism characterized in the tissues by short, rod-like, blunt cells, 2 to 5 by 1 to 3 μ, or ovoid cells, and in culture by hyphae, 1 to 5 μ in diameter, producing laterally or terminally, singly or in groups, numerous spherical, ovoid or piriform, pediculate or sessile conidia, 2 to 6 by 2 to 4 μ. On Sabouraud's dextrose and wort agar at 37·5° C. the typical colonies of *Sporotrichum* developed, the species involved being apparently *S. beurmanni* [*R.A.M.*, xiv, p. 309], considered by the writers to be doubtfully distinct from *S. schenckii* [see preceding abstract]. The cultural characters of the fungus on these and 15 other media are described. The organism was shown by inoculation tests to be pathogenic to laboratory animals.

Milochevitch (S.). **Contribution à l'étude du Trichophyton rubrum.** [Contribution to the study of *Trichophyton rubrum*.]—*Ann. Parasit. hum. comp.*, xiii, 3, pp. 253–258, 1 pl., 1935.

From a case of sycosis of the beard in Jugo-Slavia in 1930 the author isolated a strain of *Trichophyton rubrum* corresponding to the *lanoroseum* type of Ota and Kawatsuré [*R.A.M.*, xiii, p. 303]. On natural media this strain produced all the morphological features typical of *Trichophyton*, namely, simple and composite clusters of spores, typical club-shaped spindles, perfect 'vrilles' [terminal spirals] with several convolutions, and pyriform aleuria.

Ch'in (T. L.). **A mycological study of a case of otomycosis.**—*Chinese med. J.*, xlix, 4, pp. 346–349, 1 pl., 1935.

From the cerumen in the auditory canal of a young Chinese male the writer isolated on Sabouraud's glucose agar and other media a

fungus identified as *Aspergillus candidus* [*R.A.M.*, xi, p. 20], apparently not hitherto recorded as an agent of otomycosis [cf. ibid., xiii, p. 577], of which this also appears to be the first case reported in China.

KAESS (G.) & SCHWARTZ (W.). **Über das Wachstum von Schimmelpilzen bei hoher relativer Luftfeuchtigkeit.** [On mould growth at high relative atmospheric humidity.]—*Arch. Mikrobiol.*, vi, 2, pp. 208–214, 5 graphs, 1935.

Two methods [details of which are given] were used to investigate the growth of *Penicillium flavo-glaucum* [an agent of putrefaction in meat: *R.A.M.*, xiii, pp. 702] at high relative atmospheric humidities and low osmotic pressures. The results of the experiments, which agreed completely by both methods, showed that the mould makes the best growth at a relative atmospheric humidity of 99·35 per cent., corresponding to an osmotic pressure of roughly 8·0 atmospheres in the nutrient medium.

WOOD (F. W.) & THORNTON (H. R.). **The microbiology of butter. I. The yeast and mold count of butter as a measure of creamery sanitation.**—*Canad. J. Res.*, xii, 3, pp. 286–294, 1935.

The results of the investigation reported in this paper indicated that plate counts of yeasts and moulds contained in butter [*R.A.M.*, xiii, p. 580], a method which is extensively used in Canada, are not sufficient as a measure of the sanitary condition of creameries, and should be supplemented by simultaneous bacterial counts. In the samples tested the only relation observed between the different kinds of micro-organisms in butter was that high yeast counts tended to occur in butter with a high bacterial content. Pasteurization of cream was found to destroy the fungi but not all the bacteria, and butter manufactured in churns with external butter workers was characterized by a high yeast and mycoderm [ibid., xiii, p. 97] count.

THORNTON (H. R.) & WOOD (F. W.). **The microbiology of butter. II. The growth of molds in and upon butter.**—*Canad. J. Res.*, xii, 3, pp. 295–305, 1935.

Continuing their microbiological studies of butter in Canada [see preceding abstract], the authors distinguish surface (frequent) and interior (rare) moulding of butter, the latter occurring as smudgy, dark areas or patches throughout the interior mass and usually resulting in almost complete loss of the butter. The results of their investigations suggest that the growth of the moulds is not initiated in the moisture incorporated in the butter, but probably in condensation moisture on the various surfaces of butter, since samples moulded freely at ice-box temperatures in the presence of high atmospheric humidity but not when humidity was low. No relation was found between the mould count of butter and the subsequent development of mouldiness. Of the four treatments tested for the prevention of mould on packed butter, the best protection was given by parchment wrappers soaked in hot or cold saturated brine. A species of *Cladosporium* [*R.A.M.*, xiii, p. 443] was isolated from mouldy patches in butter showing interior moulding.

Beresova (Mme E.) & Savtchenkova (Mme M.). Бактериальные болезни Льна. [Bacterial diseases of Flax.]—*Микробиол.* [*Microbiol.*], iv, 1, pp. 103–120, 10 figs., 1 diag., 1935. [English summary.]

Three groups of bacterial diseases of flax have been differentiated at the U.S.S.R. Flax Institute, viz. (1) those attacking the plant itself, (2) those reducing seed germination, and (3) those inducing physiological changes in the root system without visibly affecting the tissues.

The organisms comprising group (1) are butyric acid-forming, sporing rods, facultative anaerobes, causing acetone-ethylic fermentation of carbohydrates and assimilating nitrogen in mineral (ammonium sulphate) and organic (peptone) forms. The pathogenicity of the bacteria was demonstrated by a series of laboratory and field experiments [a fully tabulated account of which is given]. Two types of lesions have been observed, one involving injury to the roots and occurring on all kinds of soil, and the other, manifested by stunting of the root system and dying-off of the growing-point, which is confined to virgin soils. Bacteria diminish the yield of straw by 40 per cent. and of seed by 18 per cent. Under favourable conditions of plant growth a new root system may be formed and the dead stem replaced. Individual strains of bacteria show variations in virulence, and some reduce the yield on rich, dark-coloured soils as heavily as on poor, sandy loams, though the general tendency is for the latter to be most affected.

Further studies are required in the case of the seed bacterioses, causing a loss of germination of 28 per cent., and also on those responsible for physiological changes in the root system and reducing the yield by 15 to 20 per cent.

Bacterial infection of flax appears to be largely controllable by proper tillage on virgin soil and the use of suitable fertilizers.

Kikuchi (M.). **Physiological studies on a wilt-resistant strain of Flax with special reference to the effect of soil condition.**—*Proc. Crop Sci. Soc. Japan*, vi, pp. 259–279, 1 pl., 4 figs., 1934. (Japanese, with English summary.) [Abs. in *Jap. J. Bot.*, vii, 3–4, p. (45), 1935.]

A selection of the Riga strain of flax highly resistant to wilt (*Fusarium lini*) [*R.A.M.*, xiv, p. 362] showed an incidence of only 0 and 2·1 per cent. infection at low and high soil moistures, respectively, the corresponding figures for the original strain being 68 and 42 per cent. The optimum temperature [for infection of the Riga selection by *F. lini*] was found to lie between 25° and 30° C. One of the factors contributing to the wilt resistance of the new strain may be the high osmotic strength of the epidermal or subepidermal cotyledonary cells, as gauged by the action of a 0·3 to 0·5 mol. sugar solution.

Müller (A. S.). **Brazil: preliminary list of diseases of ornamental plants in the State of Minas Geraes.**—*Int. Bull. Pl. Prot.*, ix, 5, pp. 104–105, 1935.

A list is given of some well-known fungous diseases affecting ornamental plants in Brazil, where mosaic is also reported on dahlias [*R.A.M.*, xiii, pp. 355, 492], *Gladiolus* sp. [ibid., ix, p. 628], and lilies [ibid., xiii, p. 379].

Smith (K. M.). **A virus disease of Primula obconica and related plants.**—*Ann. appl. Biol.*, xxii, 2, pp. 236–238, 1 pl., 1935.

A brief description is given of a virus disease which was found by D. E. Green attacking a *Primula obconica* plant grown at Wisley, Surrey, in a frame with young vegetable marrows. The disease was successfully transmitted by inoculation to young plants of *P. sinensis*, the resulting symptoms being very similar to those on the *P. obconica* plant and to a number of Solanaceous plants, including *Nicotiana glutinosa* and White Burley tobacco, the symptoms on which were very reminiscent of those produced by cucumber virus 1 [*R.A.M.*, xiv, p. 554] in comparative inoculation tests. Furthermore, both viruses produced similar local lesions on cowpea (*Vigna sinensis*) leaves, and their longevity *in vitro* was less than 96 hours. These results suggest that the *P. obconica* virus is a strain of cucumber mosaic [cf. ibid., xi, p. 797].

Verona (O.). **Di una batteriosi dell' 'Aster chinensis' L.: 'Bac. asteris', n.sp.** [A bacteriosis of *Aster chinensis* L.: '*Bacillus asteris*' n.sp.]—*Riv. Pat. veg.*, xxv, 1–2, pp. 15–24, 1 pl., 1935.

In June 1934 the author examined severely wilted asters (*Aster chinensis*) [*Callistephus hortensis*] growing in a nursery at Leghorn, where the disease had practically killed off all the early varieties and a large part of the late ones. The roots of the affected plants were normal, but the aerial parts had almost completely withered up. Neighbouring nurseries were also widely affected.

A bacillus was constantly isolated from diseased material, and inoculations with pure cultures produced positive results in healthy asters. Growth became appreciably retarded, and after ten days the leaves at the base began to wither. Brown areas formed on the stems and spread upwards, passing into the petioles and veins and mesophyll of the leaves, which dried up. Fifteen to twenty days after the inoculations the plants were withered completely. The roots remained unaffected, but the stem vessels showed necrosed areas. The organism was re-isolated from the artificially infected plants.

The characters of the organism are as follows: it coagulates milk, decomposes glucose, saccharose, lactose, mannose, mannite, and glycerine without the production of acids or gas, utilizes proteic but not amidic nitrogen, less readily ammonium sulphate, and does not reduce nitrates or form indol, is Gram-negative, non-acid fast, is motile with peritrichiate flagella, rod-shaped, rounded at the ends, measures 2 to 4 by 0·8 to 1·2 μ, occurs singly, in pairs, or frequently (in young cultures) in chains, and forms central, elliptical spores measuring 1 to 2 by 0·6 to 0·8 μ.

Though the organism has some affinities with the *Bacillus vulgatus* group [cf. *R.A.M.*, xii, p. 109], its cultural characters on the whole differentiate it as a new species, and it is named *B. asteris* n.sp.

Williams (P. H.). **Leafy gall of the Chrysanthemum.**—*Rep. exp. Res. Sta. Cheshunt, 1934*, pp. 39–40, 1935.

Further soil inoculations with the organism resembling *Bacterium tumefaciens* isolated from chrysanthemum leafy gall at Cheshunt

[*R.A.M.*, xiii, p. 638] failed to demonstrate its pathogenicity; when it was inoculated into chrysanthemum and tomato stems near the growing-point small swellings were frequently produced, not definitely distinguishable, however, from those due to wounding. The organism is probably saprophytic. Moreover, the results of pot culture experiments with sterilized soil showed that the soil is not a source of infection.

PRETI (G.). **Marciume delle piantine di 'Cephalocereus senilis'.** [Rot of *Cephalocereus senilis* seedlings.]—*Riv. Pat. veg.*, xxv, 1–2, pp. 1–14, 6 figs., 1935.

In July 1934 *Cephalocereus* [*Cereus*] *senilis* seedlings in a nursery in Italy developed a collar rot associated with reduced root growth and a rotting of the tap root and rootlets; ultimately the plants turned yellow and withered.

Under damp conditions the diseased parts of the stems became covered with a white, flocculent, septate mycelium bearing hyaline conidia, which were fusiform, straight, or lanceolate, mostly 3-septate, measuring 29 to 52 by 4·5 to 6·5 μ, but sometimes 1- to 2-septate and 11·6 to 23·2 μ long. The fungus is considered closely to resemble *Fusarium dianthi* [*R.A.M.*, xiii, p. 151]. The maximum, minimum, and optimum temperatures for conidial germination (for which light was necessary) were, respectively, 25° to 30°, 8° to 10°, and 23° C. Infection had been favoured by soil, cultural, and climatic factors, and suggestions are made for control by sanitary practices and soil treatments.

WHITE (H. L.). **Carnation diseases.**—*Rep. exp. Sta. Cheshunt, 1934*, pp. 46–51, 1935.

In 1934 carnations growing in nurseries near Cheshunt developed a serious wilt which was ascertained to be due to *Verticillium cinerescens* [*R.A.M.*, xiii, p. 515]. The results of comparative inoculations showed that *V. cinerescens* caused a slow wilt with extensive vascular infection, whereas *Fusarium culmorum* [loc. cit.] caused a rapid wilt associated with rotting of all the tissues near the point of inoculation. *V. cinerescens* is transferable from crop to crop on cuttings, and is probably spread from one nursery to another on stock exchanged or sold. Tomatoes may safely be used as an alternative crop on carnation beds badly infected with *V. cinerescens*.

ORCHARD (O. B.). **A disease of Winter Cherry.**—*Rep. exp. Res. Sta. Cheshunt, 1934*, pp. 54–55, 1935.

Growers in the vicinity of Cheshunt have lately sustained heavy losses (in one recent case amounting to 30 per cent.) from a *Phytophthora* wilt of winter cherries (*Solanum capsicastrum*), probably due to *P. parasitica*, which attacks the plants at any stage of growth. The first symptom is a slight wilting of the whole or part of the plant; this is followed by total collapse in two or three weeks. The fungus was readily isolated and inoculations in early autumn of stems of healthy plants at soil level caused complete wilting in about three weeks, whilst others on the green stem wood resulted in wilting of the shoot above the point of inoculation in ten days. Tomato seedlings collapsed three days after inoculation. Control measures recommended comprise soil sterilization

or disinfection with Cheshunt compound [*R.A.M.*, xiii, p. 714], and the use of uncontaminated water, e.g., from deep wells or from a water-supply company [ibid., i, p. 373].

Mehlisch (K.). **Falscher Mehltau an Gloxinien.** [Downy mildew of the *Gloxinia*.]—*Blumen- u. PflBau ver. Gartenwelt*, xxxix, 19, p. 228, 1 fig., 1935.

A species of *Phytophthora* to which the name of *P. speciosa* is given [without a diagnosis] is stated to be responsible for a downy mildew of *Gloxinia* in Germany [cf. *R.A.M.*, vi, p. 462; xii, p. 97]. The leaves and petioles of affected plants are soft and brown and total collapse soon takes place. Oospores of the fungus are formed in tissues placed in a moist chamber. Control should be based on appropriate cultural methods, with special attention to occasional heating of the houses during cool, sunless weather in June and July, supplemented if necessary by the application of a copper-containing spray, such as vomasol C [ibid., xii, p. 380].

Bewley (W. F.) & Oyler (E.). **A disease of cultivated Heaths.**—*Rep. exp. Res. Sta. Cheshunt, 1934*, pp. 55–60, 1935.

In June 1934 a serious disease of *Erica hiemalis* and *E. nivalis* appeared in a nursery near Cheshunt. The foliage turned grey, the tops of the plants wilted, and complete withering and death ensued. A species of *Phytophthora* resembling *P. syringae* [*R.A.M.*, xiii, p. 809] was isolated from affected material and inoculations of healthy branches or the soil in which the plants grew gave positive results, the organism being re-isolated from the infected plants. The disease made more progress at cucumber-house temperatures than lower ones.

Sommer (H.). **Mehltau jetzt auch an Kalanchoe.** [Mildew now also on *Kalanchoë*.]—*Blumen- u. PflBau ver. Gartenwelt*, xxxix, 20, p. 240, 1935.

The species of *Kalanchoë* affected by mildew (*Oidium*) at Darmstadt [*R.A.M.*, xiv, p. 586] is stated to be *K. blossfeldiana*, the only pathogenic fungus hitherto recorded on which appears to be the agent of a stem rot, probably *Fusarium herbarum*. Good control of the mildew has been effected in local nurseries by washing the diseased leaves with a quinosol solution [ibid., xiii, p. 792], though blemishes remain in the form of dark scars. The Geisenheim Phytopathological Experiment Station recommends treatment of the foliage with a solution of soft soap.

Small (T.). **Narcissus fire (Botrytis polyblastis, Dowson).**—*Gdnrs' Chron.*, xcvii, 2524, pp. 304–305, 1 fig. (p. 301), 1935.

In March 1933 Victoria daffodils [*Narcissus pseudo-narcissus*] in Jersey were severely attacked by *Botrytis polyblastis* [*R.A.M.*, xiii, p. 772], the identification of which was confirmed by S. F. Ashby. Minute, water-soaked to light brown spots developed on the perianth and corona just as the flowers were ready for picking; overlooked at first, they rapidly spread and destroyed the blooms in a night. Previous reports from the United Kingdom mention the symptoms as affecting

only the leaves, though sclerotia have sometimes been found also near the neck of the bulb. In the present case, however, neither leaves nor bulbs were involved. The attack recurred in March 1935.

Bewley (W. F.), Orchard (O. B.), & Williams (P. H.). **Rose diseases.** —*Rep. exp. Res. Sta. Cheshunt, 1934*, pp. 51–54, 1935.

Excellent control of rose mildew [*Sphaerotheca pannosa*: *R.A.M.*, xiii, p. 637] both in glasshouses and the open was obtained at Cheshunt by spraying with copper compounds in an emulsified oil.

The rust used in the 1933 spray tests [loc. cit.] was ascertained to be that which attacks *Rosa canina* and the seedling briars; it is now termed *Phragmidium* A pending complete identification, while that attacking *R. laxa* and cultivated roses is referred to as *Phragmidium* B. The latter is less susceptible to the copper-oil spray than the former and the spray requires to be modified before it can be recommended for use against this disease. Rust collections from different sources were tested on various species and varieties of roses to determine their host range; the results so far obtained are tabulated. To secure infection following inoculation in the laboratory, humidities of not under 90 per cent. were maintained for three to four days. Infection was obtained at temperatures between 60° and 70° F.

The death of rose-trees in gardens and glasshouses was in a large proportion of cases associated with *Coniothyrium rosarum* [ibid., xiv, p. 313].

Graber (L. F.) & Jones (F. R.). **Varietal survival of Alfalfa on wilt-infested soils.**—*J. Amer. Soc. Agron.*, xxvii, 5, pp. 364–366, 1935.

To determine the influence of bacterial wilt (*Phytomonas insidiosa*) [*Aplanobacter insidiosum*] in curtailing the life of lucerne stands in southern Wisconsin [*R.A.M.*, xiv, p. 515], a field comparison was made between the winter-hardy and wilt-resistant Ladak and Turkestan varieties, the winter-hardy but wilt-susceptible Grimm, Canadian variegated, and Cossack, and the regional strains of susceptible and semi-hardy Montana and South Dakota common lucerne. All the strains were grown on wilt-infested soil. The field was cut twice annually for five consecutive years and the survival ascertained by population counts. Wilt appeared in the summer and autumn of the third year (1932) and all the susceptible varieties, except Cossack, were almost completely eliminated by the disease and winter injury at the end of the third and fourth cutting years. Cossack, though severely infected, proved intermediate in survival incidence between the rest of the susceptible varieties and the resistant types, but only the latter maintained good stands at the close of the fifth year. Wilt infection appeared to reduce the winter survival of the normally hardy but susceptible varieties to such an extent that they behaved temporarily like the non-hardy types.

Weimer (J. L.). **Leaf spots of Melilotus indica.**—*Plant Dis. Reptr.*, xix, 7, p. 105, 1935.

Sclerotinia sclerotiorum was isolated in January, 1935, from large, light brown spots on the leaves and from decaying stems of *Melilotus*

alba at Riverside, California. Inoculation experiments with ascospores of the fungus gave positive results on *M. indica*, apparently not hitherto recorded as a host of *S. sclerotiorum* [*R.A.M.*, iii, p. 651]. *M. indica* was further observed in February to be heavily infected by a species of *Cercospora* with spores measuring 27 to 38 by 2 to 3·6 μ and thus falling within the range fixed by Horsfall for *C. zebrina* [ibid., ix, p. 319].

Csorba (Z.). **Untersuchungen über die Ursachen der Empfänglichkeit und Widerstandsfähigkeit der Apfelsorten gegen den Apfelmehltau.** [Studies on the causes of susceptibility and resistance of Apple varieties to Apple mildew.]—*Z. PflKrankh.*, xlv, 5, pp. 280–296, 12 figs., 1 graph, 1935.

This is an expanded account of the writer's investigations at the Budapest Phytopathological Institute on the causes underlying the susceptibility and resistance of some standard apple varieties to mildew (*Podosphaera leucotricha*), a note on which has already appeared [*R.A.M.*, xii, p. 517]. The resistant varieties used included Török Bálnit, Entz's Rosmarin, and Red Winter pogácsa, while among the susceptible sorts were Jonathan, Muscatel Pippin, and Yellow Bellflower.

Christoff (A.). **Mosaikfleckigkeit, Chlorose und Stippenfleckigkeit bei Äpfeln, Birnen und Quitten.** [Mosaic spotting, chlorosis, and bitter-pit spotting in Apples, Pears, and Quinces.]—*Phytopath. Z.*, viii, 3, pp. 285–296, 12 figs., 1935.

Further observations are made on the virus chlorosis of apples and other Rosaceae in Bulgaria [*R.A.M.*, xiv, p. 316]. The following varieties of three-year-old grafted apple-trees in the State nursery at Tscherwena woda were affected by mosaic or infectious chlorosis. Stanimaschka Aivania, Kitschowka, Winter Golden Pearmain, Baumann's Pippin, Yellow Bellflower, Momitzi, Large Kassel Pippin, Kokradjanka, and Champagne Pippin. In the thirty-year-old orchards of Obrastzow-tschiflik the fruit of all the affected varieties was shed in quantities up to maturity. In the Grey French Pippin a deformation of the corolla of the blossoms on individual branches was noted, similar to that occurring in *Rosa gallica* attacked by mosaic. Slight deformation of the fruits was observed in Large Kassel Pippin and Winter Citron, the latter also showing occasional marked symptoms of bitter pit [ibid., xiv, p. 592]. The latter disease was also prevalent on Schöne Josephina fruits, and buds of this variety grafted on a wild damson and four wild apples resulted in the development of mosaic symptoms on these hosts after 9 and 27 days, respectively. Similar results were later obtained on a Winter Golden Pearmain inoculated with the juice of an affected Schöne Josephina apple, the incubation period in this case being ten days. These data are considered to show that bitter pit partakes of the nature of mosaic and virus chlorosis.

Among the pear varieties liable to mosaic of the foregoing type are Enisseika, Pastor, Edra Kasna, Hardenpont, and other Butter types, Bonne Louise d'Avranches, and Williams' Bon Chrétien. The mottling of the leaves is not of a very accentuated character, and on bearing trees a more or less pronounced chlorosis is often the only outward sign of

disease. The widespread scorching of the foliage frequently observed in southern Bulgaria is thought to be largely due to the virus. A very typical feature of the disease is the formation of superficial, ill-defined, pale, later dark to blackish-brown spots on the pedicels followed by a shedding of the young fruits. Those remaining on the tree develop dark green, scattered or confluent spots, mostly on one side and being either superficial or involving the formation of scars. The inoculation of wild pear and apple seedlings with buds from pear trees affected by chlorosis, scorching, and bitter pit resulted in the development of mosaic after an incubation period of ten days on the pear and of thirty on the apple. Furthermore, buds from Bon Chrétien grafts showing mosaic symptoms were inoculated into three two-year-old wild apples and one pear, with the result that two of the former and the latter developed mottling, the symptoms on the pear resembling those induced by the transmission of mosaic from *R. gallica*. The virus nature of pear chlorosis is considered to account for the conflicting results reported from treatment of the disease with iron salts [ibid., x, p. 676].

On one-year-old quince grafts the symptoms of virus chlorosis are identical with those described for apple and pear, but on bearing trees they are even more variable. Deformation of the fruit is a marked feature on the Portuguese and Bereckzi varieties; in many cases the leaves show contortions and malformations of different kinds, accompanied by chlorosis and scorching. A further anomaly was observed in Portuguese quinces, consisting in a multiplication of the petals from five to as many as ten in a single flower. The fruits of the Portuguese and Bereczki varieties were deeply furrowed and sometimes deformed or grown together; bitter pit developed on the fruits of some varieties (including Portuguese) at maturity and in others during storage, while a network of rust-coloured lesions covered the entire surface of the Bereczki fruits. The damage to quince fruits was the most conspicuous and uniform feature of the virus disease, mosaic and chlorosis of the leaves being relatively slight and sometimes altogether absent. Apple-seedlings inoculated with buds from diseased quinces developed mosaic.

The author concludes from these results that a single virus is responsible for the various disorders herein described on all three fruits.

Nose (T.). **On the ring disease of Pears and the causal organism, especially on its perfect generation of Physalospora piricola n.sp.**—*n. agric. Exp. Sta. Chosen*, vii, pp. 156–163, 2 pl., 1933. (Japanese.) [Abs. in *Jap. J. Bot.*, vii, 3–4, p. (54), 1935.]

The destructive ring disease of pears so prevalent in Korea has been found to be due to *Macrophoma kuwatsukaii* Hara, the perfect stage of which is a new species of *Physalospora*, for which the name *P. piricola* [*R.A.M.*, xiv, p. 498] is proposed. The fungus, which produces a number of blackish-grey, concentric lesions in the fruits, has been shown by inoculation tests to be pathogenic to apples.

Montemartini (L.). **Note di fitopatologia.** [Phytopathological notes.]—*Riv. Pat. veg.*, xxv, 1–2, pp. 25–31, 1935.

After discussing the severe outbreaks of vine mildew [*Plasmopara viticola*] that, favoured by the prevailing weather conditions, occurred

in certain localities in Italy in 1934 [*R.A.M.*, xiv, p. 75] the author briefly describes a disease of pear trees associated with a *Verticillium* morphologically similar to *V. albo-atrum* [ibid., x, p. 757; xiv, p. 265]. The fungus was confined to the wood of the trunk but caused a reddening of the foliage either by means of a toxic secretion or by the obstruction of the transpiration current.

Black spot of Plums.—*Fruit World, Melbourne*, xxxvi, 5, p. 268, 1935.

Black spot of plums (*Bacterium pruni*) [*R.A.M.*, xiii, p. 424] is stated to be increasing in the Stanhope district of Queensland, where no variety appears to be immune, but October Purple is the most susceptible. The first sign of the disease is the 'shot hole' appearance of the leaves, which drop off. Black spots surrounded by a dark green ring appear on the unripe fruit, which later cracks, and dark patches are produced on the buds, which crack as the wood ages, forming deep wounds in which the organism overwinters. Infected trees should be severely pruned, and as much as possible of the diseased wood removed and burnt. An application of zinc sulphate and lime [ibid., xiii, p. 564] at a strength of 6–4–40 should be given at bud-burst, followed by several further ones of 4–4–40 during summer.

Wormald (H.). **Preliminary laboratory tests of bactericides on the Plum bacterial canker organism.**—*Rep. E. Malling Res. Sta. 1934*, pp. 151–155, 1935.

Preliminary tests [which are described] made to ascertain the bacteriostatic (growth-inhibiting) and bactericidal (lethal) effect of various germicides on *Pseudomonas mors-prunorum* showed that growth was completely inhibited (in nutrient broth plus 1 per cent. saccharose) by 0·1 per cent. phenol, 0·01 per cent. formaldehyde (1 in 4,000 commercial formalin), 0·005 per cent. chino-[quino-]sol [see above, p. 637], 0·2 per cent. copper sulphate, 0·01 per cent. copper chloride, 0·005 per cent. zinc sulphate, or 0·0005 per cent. mercuric chloride. Immersion in aqueous solutions of 0·01 per cent. copper sulphate or 1 per cent. tar-oil killed the organism in 10 minutes, while zinc sulphate at 0·2 per cent. strength required an exposure of 20 hours.

Wormald (H.) & Painter (A. C.). **Brown rot of Plums in cold storage.**—*Rep. E. Malling Res. Sta. 1934*, pp. 148–150, 1935.

Plums stored at about 40° F. at East Malling Research Station, Kent, rotted after three to four weeks, becoming covered with a white, fluffy mycelium. The fungi chiefly responsible for the rot were *Sclerotinia fructigena* (which predominated), *S. laxa* [*R.A.M.*, xiv, p. 593], *Botrytis cinerea*, a species of *Penicillium*, and one of *Mucor*. When the plums were removed to the light *S. fructigena* tended to develop its normal, yellowish, cushion-like *Monilia* fructifications. The infected plums often adhered in clusters, showing that the disease may spread in storage from one primarily infected fruit to others in contact with it. For purposes of control improved orchard sanitation and the avoidance of injury during picking and storing are recommended.

Chandler (W. H.) & Hoagland (D. R.). **Comments on the article by A. Kozlowski on 'Little leaf or rosette of fruit trees in California'.** —*Phytopathology*, xxv, 5, p. 522, 1935.

The writers disclaim any participation in Kozlowski's views [stated to be based on the misinterpretation of certain limited observations] as to the nature of little leaf or rosette of fruit trees in California [*R.A.M.*, xiv, p. 449], and point out that he omits all reference to the specific action of zinc [ibid., xiii, p. 39] in relation to this disease.

Harris (R. V.). **Some observations on the Raspberry disease situation in North America.**—*Rep. E. Malling Res. Sta. 1934*, pp. 156–164, 1935.

In this paper, based largely on observations and experiments made during a year's residence at the Dominion Laboratory of Plant Pathology, St. Catherines, Ontario, the author gives notes on the raspberry disease situation in Canada and the United States, with special reference to virus diseases, and compares it with the situation in Great Britain. A brief account is also given of the Dominion Government raspberry certification scheme against mosaic and of breeding work in progress, chiefly against mosaic disease, in Canada and the United States [cf. *R.A.M.*, xiii, p. 357].

Colby (A. S.), Anderson (H. W.), & Flint (W. P.). **Bramble fruits. Raspberries : Blackberries : Dewberries. How to grow in Illinois.**—*Circ. Ill. agric. Exp. Sta.* 427, 72 pp., 1 col. pl., 32 figs., 1935.

In Part II of this comprehensive treatise on the commercial cultivation of raspberries, blackberries, and dewberries in Illinois, H. W. Anderson gives semi-popular notes on a number of well-known fungous, bacterial, and virus diseases [*R.A.M.*, xii, p. 770; xiii, p. 685; and preceding abstract] and their control. The symptoms of leaf curl, mosaic, and streak on raspberries are shown on a coloured plate.

Flint (W. P.) & Anderson (H. W.). **Directions for spraying fruits in Illinois.**—*Circ. Ill. agric. Exp. Sta.* 429, 24 pp., 3 figs., 1 map, 1935.

In this circular (a revision of No. 388 of the same series) directions are given for the control of the insect pests and fungous diseases affecting the fruit crops of Illinois by means of systematic applications of standard disinfectants.

Atanasoff (D.). **Mosaic of stone fruits.**—*Phytopath. Z.*, viii, 3, pp. 259–284, 26 figs., 1935.

The writer's account of his studies on the mosaic or pox disease affecting stone fruits in Bulgaria and elsewhere has already been noticed from another source [*R.A.M.*, xiv, p. 367].

Pady (S. M.). **Aeciospore infection in Gymnoconia interstitialis by penetration of the cuticle.**—*Phytopathology*, xxv, 5, pp. 453–474, 2 pl., 4 figs., 1 diag., 1935.

The results [which are fully described] of a series of inoculations at the New York Botanical Garden on blackberry, *Rubus occidentalis*,

and *R. canadensis* leaves with aecidiospores of the long-cycle rust, *Gymnoconia interstitialis* [*R.A.M.*, xii, p. 706], showed that infection takes place by means of appressoria formed at the ends of the germ-tubes. A well-defined penetration peg traverses the cuticle and cell wall and a short penetration hypha is formed in the epidermal cell. The hypha pierces the lower wall of the host cell and enters the intercellular space just below. The mycelium spreads rapidly in the leaf tissue, haustorial development being apparent after five days. Teleutospores were formed from 21 days onwards. Penetration was equally well effected through the upper (stoma-free) or the lower leaf surface of the test plants, and further evidence is adduced showing the unimportance of the stomata from the standpoint of infection. Leaves already infected by the haploid stage were similarly penetrated, no antagonism existing between the two mycelia.

Panama disease of Bananas—one-root system.—*J. Jamaica agric. Soc.*, xxxix, 4, pp. 239–241, 1935.

In a discussion at a meeting of the Board of Management of the Jamaica Agricultural Society held on 3rd April 1935 it was stated that the Advisory Committee on the banana and citrus industries had decided to recommend a change in the treatment of Panama disease [*Fusarium oxysporum cubense*: *R.A.M.*, xiv, p. 378] by requiring the removal of only the diseased plant ('one-root treatment') as a general regulation. The Director of Agriculture had come to the conclusion that this change would have to be made to secure the full co-operation of the growers, the loss of plants on the old system ('nine-root treatment') being now so severe that the regulations were no longer being effectively carried out.

Serrano (F. B.). **Control of Pineapple mealy-bug wilt.**—*Philipp. J. Sci.*, lvi, 2, pp. 111–125, 2 pl., 1935.

Exhaustive field tests [a tabulated account of which is given] carried out in 1930 in the pineapple plantations of the Philippine Packing Corporation, showed that the control of mealy-bug wilt was effected by the measures devised for the extermination of the insect (*Pseudococcus brevipes*) associated with this destructive disease, which affects mainly the premier commercial Smooth Cayenne variety [*R.A.M.*, xiv, p. 457].

Wilson (E. E.). **The Olive knot disease : its inception, development, and control.**—*Hilgardia*, ix, 4, pp. 233–264, 3 figs., 3 diags., 3 graphs., 1935.

The olive knot disease (*Bacterium* [*Pseudomonas*] *savastanoi*) [*R.A.M.*, xii, p. 521; xiii, p. 551] is stated to have become within the last five years highly destructive in California. As a result of investigations started in 1931, it was experimentally confirmed that rain is mainly responsible for the spread of the disease by washing downwards the bacteria which are exuded on the surface of the knots, and there was evidence indicating that wind-driven rain may also be responsible for

the distribution of the organisms in a lateral direction. Insects do not appear to be commonly involved in the spread of the disease. Field observations suggested that infection occurs during almost any rainy period, but chiefly during the longer rainy spells in mid-winter. As indicated by greenhouse tests, temperatures within the range observed during most winter and spring seasons do not appear to be a limiting factor. Apart from wounds on the branches, infection takes place through scars produced by the dropping of leaves, individual blossoms, and racemes, but mostly at the leaf scars, apparently during winter, when continued leaf fall provides fresh, infectible tissue, or at an earlier period, when cork formation is slow.

While under field conditions knot lesions do not develop during the winter and only appear in the spring, macroscopic symptoms developed in two weeks on trees transferred to temperature conditions favourable to growth. Observations and experiments also showed that the formation of secondary knots at a distance from primary infections through metastasis is not of common occurrence.

None of the commercial olive varieties grown in California has proved to be immune from the disease. The Mission variety, which formerly had been least affected, was badly attacked following a heavy frost in December 1932, resulting in the splitting of the bark and defoliation during the rainy season. The Sevillano, Nevadillo Blanco, and Manzanillo varieties are highly susceptible.

Spraying experiments showed that autumn, winter, and spring applications of home-made Bordeaux mixture are effective in preventing infection. The application should be renewed at different times during the winter and spring, the first spraying being made in the autumn before the onset of the rainy period.

READ (W.). **Insecticide and fungicide investigations. 1. General.**—*Rep. exp. Res. Sta. Cheshunt, 1934*, pp. 79–80, 1935.

In tests with oil-soluble copper compounds at Cheshunt the best results were obtained by emulsifying equal volumes of a 20 per cent. glue solution and a 50 per cent. solution of copper oleate in cottonseed oil. The copper oleate solution was a fairly stiff grease at normal temperatures, and the emulsification process was conducted at approximately 60° C. The product was a stable emulsion, sufficiently fluid to mix easily; it creamed very slowly when diluted to 1 in 120 with hard water. At this concentration it spread well on rose foliage and gave effective control of *Sphaerotheca pannosa* [see above p. 638.]

ISAAKIDES (C. A.). **Greece : losses caused by diseases, pests, and meteorological conditions.**—*Int. Bull. Pl. Prot.*, ix, 5, p. 107, 1935.

Inquiries by the Phytopathological Institute, Benaki, at Kiphissia, in collaboration with the Greek agricultural services, showed that in 1932 the estimated loss of agricultural products, valued at a total of 12,751,059,000 drachmas [nearly £24,000,000], from diseases was 548,058,000 drachmas [over £1,000,000]. In 1933 the corresponding figures were 14,576,148,000 [over £28,000,000], and 503,637,000 [nearly £1,000,000], respectively.

Viennot-Bourgin (G.). **Contribution à l'étude des cryptogames de Seine-et-Oise. (9e note). Notes sur les Urédinales et Ustilaginales observées en 1933–34 dans le département de Seine-et-Oise (région sud).** [Contribution to the study of cryptogams in Seine-et-Oise. (9th note.) Notes on the Uredinales and Ustilaginales observed in 1933–4 in the department of Seine-et-Oise (south region).] – *Bull. Soc. Sci. Seine-et-Oise*, Ser. III, iii, 1–3, pp. 1–17, 1935.

This is an annotated list of 91 rusts and 19 smuts which were observed in 1933–4 in the southern part of the department of Seine-et-Oise, in addition to those given in 1933 [*R.A.M.*, xii, p. 537]. It is stated, *inter alia*, that numerous inoculations on wheat and *Agropyron repens* showed that aecidiospores formed on *Thalictrum minus* and *T. glaucum* may give either *Puccinia triticina* or *P. persistens*, it being impossible to predict which of these forms will result. Snapdragon rust (*P. antirrhini*) [ibid., xiv, p. 446] caused considerable damage in 1933 and in the autumn of 1934; owing to the mild winter, uredospores continued to be formed as late as January, 1935, both on old stocks and on volunteer plants.

Beaumont (A. B.) & Snell (M. E.). **The effect of magnesium deficiency on crop plants.**—*J. agric. Res.*, l, 6, pp. 553–562, 4 figs., 1935.

The results of field plot experiments from 1929 to 1934, inclusive, in Massachusetts on magnesium-deficient soil showed that of the 17 species of crop plants that were tested buckwheat and spinach were most affected by the deficiency, and turnips, mangels, maize, and tobacco considerably so; all the others, including potatoes and clovers, were only slightly affected. A characteristic symptom was the development of chlorosis of the older leaves in the intervascular tissue; in severe cases the margin or entire leaf turned brown. There was evidence that to avoid magnesium deficiency troubles the soil should contain 60 to 80 lb. of easily replaceable magnesium per acre.

Vandendries (R.) & Brodie (H. J.). **Nouvelles investigations dans le domaine de la sexualité des Basidiomycètes et étude experimentale des barrages sexuels.** [New investigations in the domain of sexuality in the Basidiomycetes and an experimental study of sexual barriers.]—*Cellule*, xlii, 2, pp. 163–209, 1 pl., 27 figs., 7 diags., 1933. [Received August, 1935.]

In this paper the authors give a full account of their investigation into the sexual polarity of the basidiospores of several Basidiomycetes [cf. *R.A.M.*, xiii, p. 532]. Marked repulsion having been observed between non-fertile combinations of the tetrapolar species *Lenzites betulina*, a more detailed study of this phenomenon was undertaken, the results of which may very briefly be summarized as follows.

The repulsion was stronger between aerial hyphae than between those embedded in the culture medium, and was not, apparently, chemical. When the haplonts were completely separated by a vertical glass partition, the influence causing the repulsion passed through the partition, which by itself had no effect on the development of the hyphae; further experiments showed that the action took place through

mica, paraffin, and celluloid, but not through lead. The use of loosely fitting lead partitions of various thicknesses demonstrated that the incomplete nature of the partition had no effect on the phenomenon, whereas the degree of thickness did; with one and the same partition, certain haplont combinations gave rise to a barrier and others not; the intensity of the repulsion depended on the density of the opposing growths.

The experiments, taken as a whole, showed that the nature of the agent responsible for the barrier formation cannot be accounted for on any hypothesis of chemotaxis; no magnetic or electrical action can be involved, and the only comparable biological phenomenon is Gurwitsch's mitogenetic radiation. If the phenomenon is due to radiation it presupposes the presence of two emissive and receptive factors obeying Mendelian laws carried by the chromosomes of the nuclei. Proof was obtained that the nucleus of a dicaryon retains the ability to emit radiations and cause the diploid mycelium containing it to behave as a haplont in the formation of the barrier.

Corneli (E.). **Azione a distanza dei metalli sopra alcune specie fungine.** [Action at a distance of metals on some species of fungi.]—*Riv. Pat. veg.*, xxiv, 9–10, pp. 397–406, 1 pl. [on p. 412], 1934. [Received July, 1935.]

When spore suspensions of *Penicillium glaucum* in hanging drop cultures were exposed to a lead disk [cf. *R.A.M.*, xiii, p. 178] in hermetically sealed glass containers only a small percentage of the spores germinated, the figure being highest when the lead was farthest away (3·5 mm.) and lowest when it was nearest (1 mm.). When the spores were removed to normal conditions in the absence of the metal, growth was resumed, and was more rapid than in the controls. The effect of the radiation was less marked on the spore masses than on single spores, and when open containers or copper and silver disks in closed ones were used no appreciable effect of the radiation resulted.

Further experiments indicated that the distance of the metal from the fungus was less important than the area of the disk and the volume of the container, the effect of a disk of given size at a given distance increasing as the volume of the container decreased.

Ascochyta pisi and *Tricothecium roseum* were less susceptible to the radiation than was *P. glaucum*; the uredospores of *Uromyces betae* remained unaffected.

That germination was reduced only in sealed containers was due, in the author's opinion, to the fact that in these there was a constantly increasing accumulation of secondary radiation [loc. cit.], or a progressively more complete ionization of the atmosphere.

Sempio (C.). **Azione di alcuni metalli a distanza, per contatto, ed in soluzione sullo sviluppo della 'Thielavia basicola' Zopf. e su altri parassiti.** [The action of certain metals at a distance, in contact, and in solution on the development of *Thielavia basicola* Zopf. and on that of other fungi.]—*Riv. Pat. veg.*, xxiv, 9–10, pp. 413–491, 1 pl. [on p. 492], 1934. [Received July, 1935.]

In this paper the author gives the results of his elaborate investiga-

tion of the effect of radiation by different metals on the germination and subsequent development of the conidia of *Thielavia* [*Thielaviopsis*] *basicola* and other fungi [see preceding abstract].

At a distance of 1–2 mm. from the fungus in hanging drop broth cultures, lead either prevented germination of *T. basicola* conidia altogether, or retarded growth considerably; the mycelium developed characteristic swellings and rosette formations, and conidia were scarcely ever produced. If the lead was removed before or at the commencement of germination the fungus at once began to grow rapidly, the mycelium being similar to that of the controls, though less developed. Copper and aluminium very slightly retarded the early stages of development of *T. basicola*, while platinum, silver, and gold had practically no effect on germination and only a slightly depressive effect on growth of the germ-tube.

When copper, aluminium, or silver filings were placed in contact with the conidia of *T. basicola* in hanging drop broth cultures growth was completely inhibited as a result of large amounts of the metals passing into colloidal solution; gold and platinum filings had practically no effect, and lead was very slightly depressive.

When tested on the conidia of *T. basicola* grown in hanging drops of 2 per cent. saccharose and glycocoll, the addition of copper nitrate (to make M/1,000 solution), aluminium nitrate, or lead nitrate (both at M/10,000) had practically no effect, gold chloride slightly more, and platinum chloride still more, while silver nitrate (all at M/10,000) completely inhibited growth.

While there was a certain parallel between the effects produced by the metals in contact with the fungus and those produced by the same metals in solution, no parallel existed between these effects and those produced by the same metals at a distance. The author considers that the action at a distance was radically different from that of the metals in contact with the fungus or in solution; it was not a direct effect of the metals as such, but an indirect effect shown as a capacity to emit radiation.

When the metals were placed at a distance of 1 to 2 mm. from the spores of *Erysiphe graminis* and *Puccinia graminis* in water or broth hanging drop cultures practically no effect was produced.

Sempio (C.). **Influenza di alcuni cationi sulla recettività del Ricino al 'B. tumefaciens' e sullo sviluppo di quest' ultimo in coltura (agar di brodo).** [The influence of certain cations on the susceptibility of *Ricinus* to *Bacterium tumefaciens* and on the growth of the latter in culture (broth agar).]—*Riv. Pat. veg.*, xxiv, 9–10, pp. 493-556, 2 figs., 1 graph, 1934. [Received July, 1935.]

Experiments [which are described in detail, and the results of which are tabulated and discussed] on the effect of certain elements (as indicated by the action of their nitrate solutions) on the resistance of *Ricinus* seedlings to *Bacterium tumefaciens* showed that at the concentrations used thorium, uranium, aluminium, cerium, potassium, palladium, lead, barium, zirconium, zinc, strontium, silver, iron, and lithium were not markedly injurious to the seedlings, while nickel, cadmium, copper, mercury, and cobalt were.

Thorium, uranium, and aluminium had practically no effect on tumour development; cerium, potassium, palladium, lead, barium, zirconium, zinc, and strontium stimulated it, while the effects of silver and iron were doubtful. Cadmium, the most toxic of the metals to the seedlings, occasionally strikingly stimulated tumour growth, which showed no strict relationship to plant vigour. At a concentration of M/90,000 the nitrate slightly stimulated the growth of the seedlings and markedly stimulated that of the tumours. Copper frequently stimulated, though it sometimes depressed, tumour development; mercury at concentrations of the nitrate higher than M/15,000 or M/20,000 depressed it, but at M/30,000 to M/50,000 stimulated it; while cobalt nitrate at M/15,000 almost completely inhibited it.

Thorium, uranium, aluminium, cerium, lead, and cobalt had practically no effect on the growth of the bacterium in culture; iron was almost innocuous; potassium, zinc, strontium, and cadmium depressed it; barium and zirconium stimulated it; silver was definitely toxic; copper was highly toxic; and mercury was the most toxic of all, a M/50,000 solution of the nitrate killing the organism in a little over 8 hours.

These results strongly suggest that the effect of the metals on tumour growth was mainly due to the stimulation or depression of the natural resistance of the host to *Bact. tumefaciens.*

Reed (G. M.). **Physiologic specialization of the parasitic fungi.**—*Bot. Rev.*, i, pp. 119–137, 1935.

Following a brief introduction, the writer discusses the problem of physiologic specialization in parasitic fungi under the following headings: physiologic specialization in the cereal rusts; geographical distribution of rust races; physiologic specialization in the smuts; physiologic specialization in the powdery mildews and other fungi; morphological variations in specialized races; influence of environal factors on the reaction of differential hosts to various physiologic forms of rusts; the constancy of specialized races; and the origin of new specialized races. With the exception of a few papers published before 1922, all the work mentioned in the bibliography of 95 titles has been noticed in this *Review.*

Winge (Ö.) & Hjort (A.). **On some Saccharomycetes and other fungi still alive in the pure cultures of Emil Chr. Hansen and Alb. Klöcker.**—*C.R. Lab. Carlsberg*, Sér. Physiol., xxi, 2, pp. 51–58, 1935.

It is apparent from this tabulated account of the writers' examination in 1933–4 of pure cultures on 10 per cent. saccharose or beer wort agar of a number of Saccharomycetes and other fungi stored at the Carlsberg Laboratory, Copenhagen, between 1886 and 1922 that a considerable proportion was still viable—some 14 per cent. of the earlier and 25 per cent. of the later series—among which may be mentioned *Aspergillus oryzae* ('86), *Monilia candida* [*Candida vulgaris*: *R.A.M.*, xiv, p. 444], the strain of *Saccharomyces cerevisiae* [ibid., xiv, p. 582] isolated from Namur beer and used by Wildiers in his studies on bios [ibid., iii, p. 293] (1920), *Aspergillus nidulans* [ibid., xiv, p. 523] ('13), *Penicillium*

roqueforti [ibid., xiii, p. 443] ('22), and *Citromyces pfefferianus* [ibid., xiv, p. 115] ('19).

NARASIMHAN (M. J.). **Spraying against Alternaria of Potato.**—*Mysore agric. Cal. 1935*, pp. 17, 21, 1 pl., 1935.

Successful control of *Alternaria* disease of potatoes [*A. solani*] in Mysore [*R.A.M.*, xiii, p. 683] was obtained in small-scale experiments by applications of calcium arsenate (1 lb. in 50 galls. water) with lime caseinate as spreader, 30 to 40 days after planting, the treated plots yielding nearly 2½ to 3 times as much as the unsprayed controls. If necessary a second spray should be given when the crop is 50 to 60 days old. The cost of spraying a 30-days-old crop amounted to between 4 and 5 rupees [6*s.* and 7*s.* 6*d.*] per acre.

MACLEOD (D. J.) & HOWATT (J. L.). **Magnesium deficiency in Potatoes.** —Abs. in *Sci. Agric.*, xv, 6, pp. 435–436, 1935.

Satisfactory control of a potato disorder apparently similar to the magnesium deficiency reported from the United States [*R.A.M.*, xiii, p. 797] is stated to have been obtained in New Brunswick by the addition to the ordinary fertilizer (4–6–10) of dolomitic lime, kieserite [containing magnesium sulphate], magnesium sulphate, or magnesium carbonate, all of which were found to be equally effective when supplying the equivalent of 20 lb. magnesium oxide per acre.

VERPLANCKE (G.). **Étude d'une forme nouvelle de la 'bigarrure' de la Pomme de terre.** [A study of a new form of Potato streak.]—*Bull. Soc. Bot. Belg.*, Sér. 2, xvii, 2, pp. 105–116, 1935.

Further investigations into the nature of the potato virus disease recently recorded by the author from Belgium as a form of streak or 'streak-mosaic' [*R.A.M.*, xiv, p. 251] showed that artificial transmission by approach- or tuber-grafting gave substantially the same symptoms as transmission by rubbing or insect vectors.

Both the streak and mosaic symptoms produced by the disease were manifested on an Alpha plant inoculated by grafting, one branch of which showed mosaic symptoms and another those of streak. This suggested the presence of two viruses, but inoculations on Arran Victory plants, either with sap or by approach grafting from either the mosaic or streak branches, resulted in the production of the typical streak symptoms. From this the author concludes that the disease is due to only one virus.

Rapid purification of the causal organism by a modification of Kligler's and Olitsky's technique [*Brit. J. exp. Path.*, xii, pp. 172, 393, 1931], using carbon as the adsorbent, gave a suspension of the virus which contained only 0·101 per cent. solids.

The virus responsible for 'bigarrure' is stated to differ from the potato viruses Y [ibid., xiv, p. 326], M29 (which is probably a blend of M23 and R77) [ibid., xii, p. 586; xiii, p. 462], X–2, X–3, and X–4 [ibid., xiii, pp. 319, 797] (since it produces no symptoms on tomato), and from X–1 (in that it is transmissible by rubbing to potato varieties to which X–1 is not so transmissible). The disease, therefore, appears to be different from all previously described forms of streak.

Pfankuch (E.) & Lindau (G.). **Zur Biochemie des Kartoffelabbaues. II (1).** [A contribution to the biochemistry of Potato degeneration. II (1).]—*Biochem. Z.*, cclxxvii, 1–2, pp. 129–138, 2 graphs, 1935.

The writers' studies [the results of which are fully discussed and the statistical data tabulated] on potato degeneration at Dahlem, Berlin, indicate that the disordered metabolism constantly associated with this phenomenon arises primarily from changes and acceleration in the oxido reductions [cf. *R.A.M.*, xiv, p. 328].

Klapp (E.), Morgenweck (G.), & Spenneman (F.). **Ökologie und 'Abbau' der Kartoffel. Beziehungen zwischen Ertragshöhe, Nachbaustufen, Krankheitsbefall, und praktischen Pflanzwert.** [Ecology and Potato 'degeneration'. Relations between productivity, progeny grades, disease incidence, and practical planting value.]—*Pflanzenbau*, xi, 10, pp. 383–395, 1 diag., 5 graphs, 1935.

The results of four years' observations on the performance of original seed and progeny of the Parnassia and Erdgold potato varieties in 21 localities representing the ecological variability of Central Germany showed that, with a few striking exceptions, the yields of the progeny were very poor. In some cases the behaviour of the progeny in respect of productivity was diametrically opposed in two different places. Certain consignments of planting material of unexceptionable origin very soon developed symptoms of leaf roll, mosaic, streak [*R.A.M.*, xiv, p. 54], or stunting in one locality, while in another they and their progeny remained practically free from disease. Apart from extreme cases, the yield in the different sites of cultivation was not appreciably affected by the incidence of disease present in the crops. Streak, in particular, showed a tendency to disappear from one year to the next, and, in general, the symptoms of the various disorders were liable to merge into one another. Cases were noted in which stands with a comparable amount of disease proved to be of totally different planting value, and conversely, seed of a similar degree of productivity originated in crops with a very variable percentage of 'degeneration'. It must be assumed, therefore, either that there is no definite correlation between health and yield or (more probably) that environmental factors are at least equally important with pathological activities, the former predominating at one time and the latter at another.

Němec (A.). **Beitrag zur Kenntnis der chemischen Beschaffenheit von krebsverseuchten Kartoffelböden.** [A contribution to the knowledge of the chemical constitution of wart-infested Potato soils.]—*Phytopath. Z.*, viii, 3, pp. 303–305, 1935.

Chemical analyses [the data from which are tabulated and briefly discussed] of some potato soils infested by wart disease (*Synchytrium endobioticum*) in northern Czecho-Slovakia [*R.A.M.*, xiii, p. 723] indicated a general abundance of humus and an excess of phosphoric acid combined with a more or less markedly acid reaction. There was found to be a low content of exchangeable lime and magnesia. Similar conditions prevailed in the southern localities investigated except for a deficiency of phosphoric acid. These results do not permit any con-

clusion to be drawn concerning the effect of soil constitution on the distribution of the disease, but it is thought that the excessive use of stable manure in these districts may possibly be a contributory factor in its spread [cf. ibid., vii, p. 738].

JANY. **Welche Kartoffelsorten werden in Deutschland am meisten gebaut?** [Which Potato varieties are most widely grown in Germany?]—*Dtsch. landw. Pr.*, lxii, 18, p. 217, 1935.

Schlumberger estimates that in 1933 potato varieties immune from wart disease [*Synchytrium endobioticum*] constituted 22,000 (57·8 per cent.) of the total area of 38,000 hect. certified as satisfying official seed certification requirements [cf. *R.A.M.*, xi, p. 65; xiii, p. 466, *et passim*]. Apart from the early varieties (20 per cent. of the whole) the immunes occupied 47·8 per cent. and the susceptibles 32·2 per cent. or roughly a ratio of 3 : 2, and in the writer's opinion the time is not far distant when the former will be exclusively cultivated in Germany.

DOUNINE (M. S.) & YAKIMOVITCH (E. D.). Болезни Батата и меры борьбы с ними. [Sweet Potato diseases and their control.]—247 pp., 102 figs., Всесоюзн. Науч.-Исслед. Инст. Сои и Спецкультур [Pan-Soviet sci. Res. Inst. Cult. Soy-Bean and Spice Crops], Moscow, 1934. [Received July, 1935.]

The attempts which are now being made to spread sweet potato cultivation in the southern and eastern Republics of the Soviet Union have prompted the authors to publish this useful monograph, compiled mainly from foreign sources, summarizing all the information up to date on the more important diseases of the crop. The diseases are subdivided into those that appear during storage of seed material and in the greenhouse, those that only occur in the field, and commercial storage rots of the roots, the morphology, taxonomy, biology, geographical distribution, and control of the causal organisms being fully dealt with.

Observations in 1932 in Poti [Black Sea littoral of the Caucasus] showed the occurrence there of the following parasitic fungi, apparently new to science, which are described with diagnoses in Russian by Khokhryakoff and Dyurinski. *Leptosphaeria bataticola* n.sp., causing brown spots on the leaves, has perithecia up to 130 μ in diameter, with an emergent ostiole; the asci are cylindrical, pedicellate, rounded at the apex, 53 to 65 by 10 to 11 μ, intermixed with paraphyses; the spores are light yellow, cylindrical-fusiform, with pointed ends, 5-septate, and measure 25 to 28 by 4·5 μ. *Leptosphaerulina bataticola* n.sp., forms on the leaves rounded or oblong, brown spots, 1 to 2 cm. in diameter; the perithecia are light coloured, parenchymatous, up to 150 μ in diameter; the asci are broadly ellipsoidal, ovate or piriform, and 55 to 63 by 31 to 35 μ; and the ascospores are light brown, elliptical, slightly constricted at the septa, with three (more rarely four) transverse and one longitudinal septa, and measure 23 to 34 by 12 to 14 μ. *Coniothyrium bataticola* n.sp. forms on the leaves irregular, coalescing, whitish spots, which frequently drop out, involving a large portion of the blade. The pycnidia are fairly numerous, non-ostiolate, and up to 155 μ in diameter. The spores are brown, ellipsoidal, and 9 to 12 by 4·5 to 6 μ.

Ascochyta bataticola n.sp. forms on the leaves amphigenous, whitish or ochraceous, irregular, rounded or oblong spots, measuring 2 to 8 mm. in diameter. The pycnidia are chiefly epiphyllous, parenchymatous, and 210 μ in diameter. The spores are cylindrical or slightly fusiform, uni- (more rarely bi-) septate, and 10 to 16 by 2 to 4·5 μ. *Robillardia bataticola* n.sp. forms on the leaves dark-brown, irregular or rounded spots, up to 1 cm. in diameter, and concentrically zonate with a light-coloured centre; the infected tissues drop out, thus destroying a large part of the lamina. The pycnidia are fairly numerous, epiphyllous, paraplectenchymatous, up to 155 μ in diameter, with a slightly prominent ostiole. The spores are cylindrical or fusiform-ellipsoidal, slightly pointed at the ends, almost hyaline or faintly olive-brown (brown in mass), straight, slightly bent, or inequilateral, 11 to 15 by 3 to 4 μ, with two or three cilia at one end, about 15 μ in length. *Stagonospora bataticola* n.sp. forms on the leaves brown, irregular or rounded, sharply delimited spots, up to 1 cm. in width. The pycnidia are 125 μ in diameter, with a dark, prominent ostiole 6 to 10 μ wide. The spores are triseptate, almost hyaline or slightly fuliginous, somewhat bent or sinuous, and 25 to 30 by 3 to 3·5 μ. *Ramularia bataticola* n.sp. forms on the leaves whitish or yellowish-brown (brown on the under surface) spots, up to 4 mm. in diameter. The fasciculate, hyaline conidiophores emerge through the stomata on the upper surface. The conidia are hyaline, cylindrical, with tapering, rounded ends, bicellular, and 12 to 15 by 3 to 4 μ. *Brachysporium batatatis* n.sp. forms hypophyllous, brownish, sharply delimited, irregular or rounded spots. The conidiophores are nodose, septate, brownish, and 77 to 100 by 5 to 6 μ. The conidia are fusiform, smoky-brown, triseptate, and measure 27 to 34 by 10 to 15 μ; the two end cells are hyaline, and the central ones swollen. *Helminthosporium bataticola* n.sp. forms amphigenous, sharply delimited, irregular or rounded spots, whitish or ochraceous on the upper and brownish on the lower surface. The conidiophores are brown (paler towards the apex), geniculate, and 60 to 100 by 6 to 7 μ. The conidia are ellipsoidal at first uni- and later triseptate, smooth, brownish, and 35 to 42 by 10 to 13 μ. *Ascochyta batatae* n.sp. forms on the leaves brownish, rounded or irregular spots up to 5 mm. in diameter. The pycnidia are 140 μ in diameter. The spores are oval, cylindrical, or occasionally slightly fusiform, at first continuous but later bicellular, and 6 to 10 by 3 μ. *Mycosphaerella bataticola* Khokhr. & Dyur. is regarded as a synonym of *M. ipomoeae*.

The bibliography appended comprises 357 titles.

Endô (S.) & Sakita (S.). **A new Sclerotium disease of Echinochloa crus-galli Beauv. subsp. submutica Honda var. typica caused by Sclerotium fumigatum Nakata.**—*Trans. Tottori Soc. agric. Sci.*, iv, 2, pp. 106–110, 2 figs., 1932. [Received September, 1935.]

Sclerotium fumigatum Nakata, the agent of a sclerotial disease of rice in Japan, was observed to be pathogenic also to a variety of *Echinochloa* [*Panicum*] *crus-galli*, on which positive results were given by inoculation experiments. The pale brown round or irregular sclerotia, with the under surface flat or rarely concave, measure 462 to 1480 by 370 to 1430 μ.

Nose (T.). **On the physiological specialization of Piricularia oryzae in Corea.**—*Ann. agric. Exp. Sta. Chosen*, vii, pp. 164–173, 1933. [Abs. in *Jap. J. Bot.*, vii, 3–4, p. (54), 1935.]

Attention is drawn to the differences in cultural behaviour on various nutrient media of a number of isolations of *Piricularia oryzae* [*R.A.M.*, xiv, p. 529 and next abstract] from diseased [rice] leaves in several parts of Korea, Formosa, and Tiba Prefecture, Japan. Evidence of physiological differentiation was afforded by the divergent degree of pathogenicity exerted by the various strains in inoculation experiments.

Tochinai (Y.) & Terui (M.). **On the injurious fungi which overwinter in the Rice straw.**—*Agric. & Hort.*, ix, 24 pp., 1934. (Japanese.) [Abs. in *Jap. J. Bot.*, vii, 3–4, p. (62), 1935.]

The following fungi were isolated from surface-sterilized fragments of overwintered rice straw in Hokkaidô, Japan: *Acremoniella atra*, *Alternaria oryzae*, *Epicoccum purpurascens* [*R.A.M.*, xii, p. 69], *Fusarium lateritium*, *F. merismoides* [ibid., xii, p. 412], *F. subulatum* [*F. avenaceum*: ibid., vii, p. 710], *Gibberella fujikuroi* [ibid., xiv, p. 254], *G. saubinetii*, and *Piricularia oryzae* [see preceding and next abstracts]. Inoculation experiments with all these organisms on rice seedlings showed that the three first-named are relatively innocuous, surviving the winter in Hokkaidô only under favourable conditions. The severe pathogenicity of the remaining species is well known, and with the exception of the last-named they can withstand the extremes of the local climate.

Suzuki (H.). **Studies on the influence of some environmental factors on the susceptibility of the Rice plant to blast and Helminthosporium diseases and on the anatomical characters of the plant. I. Influence of differences in soil moisture.**—*J. Coll. Agric. Tokyo*, xiii, 1, pp. 45–108, 2 pl., 1934. [Received June, 1935.]

A comprehensive, fully tabulated account is given of the writer's studies on the relation of soil moisture and anatomical differences to the reaction of rice to blast (*Piricularia oryzae*) [*R.A.M.*, xiii, p. 267, and preceding abstracts] and *Helminthosporium oryzae* [*Ophiobolus miyabeanus*: ibid., xiv, p. 528.]

The results of inoculation experiments with *P. oryzae* on a resistant variety (Mubôaikoku), a susceptible one (Kairyôshinriki), and two upland sorts (Ôhatawase and Zairaishu) uniformly showed the susceptibility of rice to blast to increase in inverse ratio to the water content of the soil. Similar tests with *O. miyabeanus* on seedlings and adult plants gave comparable results to those obtained with *P. oryzae* in respect of the relation between susceptibility and soil moisture. Attention has already been drawn in the writer's earlier work to the correlation between resistance to *P. oryzae* and the extent of silicification of the epidermal cell walls of rice leaves, and a similar connexion was found to hold good also in the case of *O. miyabeanus*. The silica content of the leaves is located mainly in the dumb-bell-shaped cells (Reiszellen of Grob) of the upper part, which were found to be larger in the resistant plants grown on flooded than in the susceptible ones on arid

soils. A correlation was further established between resistance and the number of silicated short cells in the spike pedicel, which was larger in Mubôaikoku than in Kairyôshinriki. No significant relationship appears to exist between stomatal numbers and dimensions and reaction to *P. oryzae* and *O. miyabeanus*. To sum up, the susceptibility of rice to these diseases in arid soils seems to be partly due to the inhibition of normal development of the outer wall and of silicification, while the resistance of the Mubôaikoku variety is attributed in part to their development in a high degree.

Murray (R. K. S.). **Report of Botanist and Mycologist for 1934.**—*Rep. Rubb. Res. Bd Ceylon, 1934*, pp. 25–37, 1935.

The year 1934 was marked by an increased severity in Ceylon of *Oidium* leaf disease of *Hevea* rubber [*O. heveae*: *R.A.M.*, xiii, p. 801], not only at mid-country elevations, but also at the lower ones. Sulphur dusting was officially advised for mid-country estates, and is being adopted by numerous estates at all elevations in 1935. Dusting from the air by means of an autogiro is to be attempted, and the possibilities of applying sulphur to individual trees and groups of trees by means of rockets and bombs are being explored.

Hiratsuka (N.). **Phragmidium of Japan.**—*Jap. J. Bot.*, vii, 3–4, pp. 227–299, 2 pl., 6 figs., 1935.

This is a copiously annotated and tabulated catalogue of 26 species of *Phragmidium*, including eight new ones, collected in various regions of Japan on ornamental Rosaceae. Fungus and host indexes and a bibliography of 72 titles are appended.

Uppal (B. N.), Patel (M. K.), & Kamat (M. N.). **The fungi of Bombay.**—*Bull. Dep. Ld Rec. Agric. Bombay* 176 of 1934, viii+56 pp., 1 map, 1935.

In the introduction to this list of Bombay fungi it is stated that the number so far recorded for the Presidency is 593 compared with 2,351 enumerated by Butler and Bisby [*R.A.M.*, xi, p. 545] for the whole of India (25·2 per cent.). The fungi are arranged in alphabetical order under the chief systematic groups. Indexes of the hosts and genera of fungi, the scientific equivalents of the common names of the hosts, and a bibliography of 17 titles are appended.

Stempell (K. L.). **Studien über die Entwicklungsgeschichte einiger Entyloma-Arten und über die systematische Stellung der Familie der Sporobolomycetes.** [Studies on the life-history of some *Entyloma* species and on the systematic position of the family of the Sporobolomycetes.]—*Z. Bot.*, xxviii, 6, pp. 225–259, 1 pl., 9 figs., 1935.

The falcate conidia of *Entyloma calendulae* [*R.A.M.*, vi, p. 460] and *E. ranunculi* [ibid., vii, p. 432] were shown by the writer's cytological examination at Rostock University of material from *Calendula officinalis* and *Ranunculus ficaria*, respectively, always to contain only one haploid nucleus. They develop *in vitro* into a haploid mycelium which forms a fresh series of conidia which are vigorously discharged from their stalks. No indication of fusion between the falcate conidia or the mycelia arising therefrom could be detected. After some weeks in

culture on agar media the haploid mycelia of *E. ranunculi* and *E. calendulae* form haploid smut spores which once more develop into mycelia without the preliminary formation of promycelium or sporidia. From mixed platings of *E. calendulae* conidia and sporidia a diploid mycelium with clamp-connexions was obtained which produced typical smut spores. These germinate normally by means of a promycelium and sporidia, but after a time germination may become atypical, being associated with absence of caryogamy. The diploid mycelium of *E. calendulae* bore half-moon shaped, diploid conidia which were actively discharged in the same way as the falcate conidia ['basidiospores'] of *Tilletia tritici* [*T. caries*: ibid., xii, p. 777] and which on fresh media gave rise to a new diploid mycelium.

Derx (*Ann. mycol., Berl.*, xxviii, p. 1, 1930) subdivided into three genera, *Sporobolomyces*, *Bullera*, and *Tilletiopsis*, Kluyver's and van Niel's yeast group of the Sporobolomycetes (*Zbl. Bakt.*, Abt. 2, lxiii, p. 1, 1924), the distinguishing feature of which was its active discharge of aerial conidia [by the drop excretion mechanism]. This character, besides having been observed in *Entyloma*, is said also to occur in species of *Taphrina* [but cf. *R.A.M.*, iii, p. 108] and the author concludes from its occurrence in widely distant fungus groups that it is valueless as a taxonomic criterion.

Niethammer (Anneliese). **Die Mucorineen des Erdbodens. Verbreitung, Leistungen und Beschreibung.** [The Mucorineae of the soil. Distribution, capacities, and description.]—*Z. PflKrankh.*, xlv, 5, pp. 241–280, 10 figs., 1935.

On the basis of her own studies on the Czecho-Slovakian, German, Swiss, Italian, and Jugo-Slavian soil microflora [*R.A.M.*, xii, p. 534; cf. also viii, p. 334; ix, p. 676], supplemented by a survey of the relevant literature, the writer gives notes on the distribution in Europe and elsewhere of twenty-seven species of *Mucor*, three of *Rhizopus*, four of *Absidia*, two of *Zygorrhynchus*, one each of *Phycomyces*, *Circinella*, *Cunninghamella*, and *Thamnidium*, and two of *Mortierella*.

Mucorineae in general, and *Mucor* spp. in particular, appear to be less common in southern than in north-central Europe. *M. racemosus* [ibid., xii, p. 191], which is not confined to the soil, may be regarded as practically ubiquitous, while *M. botryoides*, with its wide temperature range of 6° to 40° C., has been found in the very divergent climates of Alaska, Palestine, and Czecho-Slovakia. *Z. moelleri* [ibid., viii, p. 335] seemed from the present investigations to occupy the most diverse habitats and the longest north-to-south extension. Soils under vegetable crops are the most common sites of the Mucorineae, especially *M. racemosus*, in southern Europe, a count of 50,000 spores per kg. of soil being no rarity, while forests also contain large numbers, especially of *M. ramannianus* [ibid., xiii, p. 484]. The main function of the Mucorineae in the soil is doubtless the breaking-down of organic nitrogen compounds. A connexion has been traced between the soil Mucorineae and their presence on the corresponding crop plants, e.g., *M. racemosus* on lettuce, cabbage, and parsley leaves and *M. hiemalis* [ibid., xi, p. 554] on celery root-stocks, parsley roots, and beets, as well as in stored products and on seed. Further studies are in progress.

Servazzi (O.). **Sull' arrossamento fogliare del Kaki. (II[a] Nota).** [On the leaf reddening of Persimmon. (2nd Note.)]—*Difesa Piante*, xii, 2, pp. 43–47, 1 fig., 1935.

In continuation of his previous communication [*R.A.M.*, xiv, p. 113] the author states that in January [?1934], under persimmon (*Diospyros kaki*) trees which during the preceding summer had exhibited the characteristic reddening described by him, he found fallen leaves, some of which bore acervuli of *Coryneum delleanii*, while others, when kept for eight days in a moist chamber at 18° C., developed pycnidia of a fungus which he refers to *Phoma kaki* Trav. & Spessa, not hitherto recorded from Italy. Attempts to reproduce the condition by inoculating persimmon leaves with the *C. delleanii* conidia or with the pycnospores produced in pure culture gave consistently negative results, suggesting the non-pathogenicity of the organisms to this host, and the probability that the reddening is of physiological origin.

Pimento.—*J. Jamaica agric. Soc.*, xxxix, 4, pp. 250–251, 1935.

The pimento [*Pimenta officinalis*] rust reported last year from Jamaica [*R.A.M.*, xiii, p. 653] has become increasingly prevalent, and is now present to a serious extent in all the larger pimento-growing areas. J. H. Faull confirmed F. E. V. Smith's opinion that the disease, which is still under observation, is new and at present unidentified.

Abbott (E. V.). **Economic importance of red rot and comparative susceptibility of some Sugar-Cane varieties in the southern United States.**—*Circ. U.S. Dep. Agric.* 350, 26 pp., 4 figs., 1935.

Since 1930 sugar-cane red rot (*Colletotrichum falcatum*) [*R.A.M.*, xiii, p. 728; xiv, pp. 257, 564], an almost constant source of loss to growers in the United States, has become even more serious than before in Louisiana owing to the widespread failure of P.O.J. 213, previously regarded as resistant.

Laboratory inoculation tests indicated that Purple, Ribbon, D-74, C.P. 807, and P.O.J. 213 were very susceptible; Co. 290, P.O.J. 36-M, C.P. 29/320, and Cayana susceptible; P.O.J. 36, P.O.J. 234, and C.P. 28/19 moderately susceptible; and Co. 281, C.P. 28/11, and C.P. 29/291 resistant.

In field inoculation experiments made by inserting a culture of the fungus into holes made in alternate internodes of the stalk, P.O.J. 213, P.O.J. 36–M, and C.P. 807 showed, on the whole, the greatest reductions in germination and yield of cane and sugar, only insignificant reductions being noted in P.O.J. 234, Co. 281, and Co. 290. Both Co. 290 and C.P. 807 are more resistant in the field than the laboratory tests would indicate, and this behaviour is attributed partly to their rapid germination and vigorous root development which prevents nodal infection. Heavy loss of stands due to red rot caused reduction in sucrose content and purity of the cane juice.

Melanconium [*Pleocyta*] *sacchari* [ibid., xiii, pp. 127, 595] caused significant reductions in the germination of C.P. 807, P.O.J. 213, P.O.J. 36-M, and P.O.J. 234, with corresponding losses in yield of cane and sugar in all these varieties except P.O.J. 234. *P. sacchari* is of

secondary importance in seed rotting. The presence of two species of *Fusarium* and one of *Basisporium* [*Nigrospora*] was noted in rotting seed cane, but these organisms are regarded as unimportant.

Sakuma (I.) & Momose (I.). **Studies on the colouring substances of the Cane sugar.**—*J. Soc. chem. Ind., Japan*, xxxviii B, 4, pp. 161–163, 1935.

In the course of studies on the injurious action of colouring substances in raw sugar-cane juice, the authors estimated the effect of red rot (*Colletotrichum falcatum*) [see preceding abstract] on the juice by means of a spectrophotometer. At P_H 7·0 the ratios of absorption at 4,720 Å to those at 5,900 Å were 1·886 and 2·64 for the red rot colouring matter and saccharetin (a brownish-red liquid from healthy canes), respectively.

Gadd (C. H.). **Report of the Mycologist for 1934.**—*Bull. Tea Res. Inst. Ceylon* 12, pp. 22–25, 1935.

The most outstanding feature of the 1934 tea season in Ceylon [cf. *R.A.M.*, xiii, p. 540] was the mortality of the bushes caused by drought, especially in 'dry' localities.

A detailed study of *Poria* [*hypolateritia*: ibid., xi, p. 749] root disease in the field showed that, under the conditions prevailing at St. Coombs (where numerous diseased patches are present), the fact that no death has occurred in a patch for twelve months is not a safe indication that the fungus is no longer active in the soil. To determine whether a given area is free from the disease it is suggested that *Tephrosia vogelii* might first be planted, and if it reaches the flowering stage without becoming infected, it may safely be assumed that the area is free from the fungus. The use of closed bags for the transport of diseased material for destruction is strongly advocated, as infections frequently start from pieces of such material dropped on the road-sides.

On p. 56 of the bulletin it is stated that sulphur dust applied at the rate of 10 lb. per acre within two or three days of picking caused a very definite taint in made tea. This amount, however, is much more than would normally fall on tea during *Hevea* dusting against *Oidium* [*heveae*: see above, p. 654] and experiments are being made to determine the limit tea will tolerate.

Clayton (E. E.) & Stevenson (J. A.). **Nomenclature of the Tobacco downy mildew fungus.**—*Phytopathology*, xxv, 5, pp. 516–521, 3 figs., 1935.

With a view to resolving the problem of the nomenclature of the tobacco downy mildew fungus, the name *Peronospora hyoscyami* being considered untenable, four collections of Spegazzini's herbarium material, dated 1888, 1896, 1897, and 1899 have been examined. Neither Adam, who proposed to rename the organism *P. tabacina* nor Wolf and collaborators who regard it as identical with *P. nicotianae* Speg. [*R.A.M.*, xiii, p. 602], are thought to have had access to these specimens [though Adam examined the 1897 material, cf. ibid., xiii, p. 132], the earliest collection of which is represented by the conidial stage while the others show oospores.

Two statements in Spegazzini's extended account of the disease (*Ofic. Quim.-Agric. Prov. Buenos Aires Bol.* 4, 1898) point to the identity

of *P. nicotianae* with the United States downy mildew, viz., its pathogenicity to numerous species of *Nicotiana* and a reputed resemblance to *P. hyoscyami*. On the other hand, the symptoms attributed to *P. nicotianae* do not markedly resemble those of the United States disease, the oospores of the fungus associated with which, moreover, are quite different from those of *P. nicotianae*, averaging 32 to 40 μ in diameter against 62 to 78 μ for the Spegazzini collections and 35 to 60 μ for *P. tabacina*, and agreeing with the latter species in the dark brown colour and in the pattern of the epispore. The conidia of Spegazzini's fungus are expressly stated to have germinated indirectly by means of zoospores, the formation of which, on the contrary, has never been observed by the writers in United States material. Attempts to obtain fresh material from the Argentine were unsuccessful as the disease has not been observed there for ten years at least. On the basis of the evidence at presence available, therefore, the authors recommend the use of the name *P. tabacina* for the agent of downy mildew in the United States, Adam's description of this species corresponding in essentials with the writers' specimens.

Van der Meer Mohr (J. C.). **Verslag van het Deli Proefstation over het jaar 1934.** [Report of the Deli Experiment Station for the year 1934.]—*Meded. Deli-Proefstat.*, Ser. 2, xcii, 47 pp., 1 graph, 1935.

The following items of phytopathological interest occur in this report. Extensive investigations by Jochems have shown that mosaic ('pehsim') in tobacco seed-beds [*R.A.M.*, xiv, p. 473] may be controlled by thorough sanitation, including the clearing-up of diseased beds and destruction of the seedlings; speedy eradication and burning of isolated mosaic plants in the field; and the fencing-in of mosaic plots, all operations in which should be performed by special gangs of coolies, whose hands must be washed in 5 per cent. formalin immediately after dealing with infected material.

The results of experiments in the control of slime disease [*Bacterium solanacearum*: ibid., xiii, pp. 475, 659; xiv, p. 473] by liming were inconclusive, but some improvement was effected by light applications. Tests on tomato plants showed that double superphosphate increases the incidence of slime disease, while ammonium sulphate and sodium nitrate tend to reduce it (the latter only in the early stages of growth), as also to a lesser extent do potassium sulphate, double potassium carbonate, and tobacco ash. Slag dust also causes a heavy reduction in the percentage of infection. Guano was found to promote the development of the disease, an effect that was partially counteracted by the simultaneous use of slag dust or tobacco ash and largely obviated by a combination of both.

Trotter (A.). **Le malattie batteriche del Tabacco.** [Bacterial diseases of Tobacco.]—*Boll. tec. Tab.*, xxxii, 2, pp. 101–139, 3 pl., 11 figs., 1935. [English summary.]

A copiously annotated list is given of the bacterial diseases affecting tobacco, of which the following have been recorded in Italy: *Bacterium maculicola* [*R.A.M.*, vii, p. 558; x, p. 62]; *Bacillus phytophthorus* [ibid., xiii, p. 100] (of sporadic occurrence only); *B. carotovorus* [ibid.,

xiii, p. 274], observed by the writer on *Nicotiana rustica* near Cava dei Tirreni; *Bact. melleum* [ibid., x, p. 62], recently detected by Petri in Bolzano; *Bact. pseudozoogloeae* [ibid., xi, pp. 677, 766] on Levantine tobacco in Leccese; *Bact. solanacearum* [see preceding abstract] on Kentucky tobacco in Cologna, Venice; and *Bact. tabacum* [see next abstract] in the Venetian Alps and Trentino. The list is preceded by an introductory account of bacterial diseases and the diagnostic features differentiating them from virus infections and nutritional disorders (dystrophisms), and by an analytical key to the bacterioses; it is followed by a section on the control of the latter and by a three-page bibliography.

Böning (K.). **Versuche zur Bekämpfung des Wildfeuers an Tabak mit chemischen Mitteln.** [Experiments in the control of Tobacco wildfire with chemical preparations.]—*Prakt. Bl. Pflanzenb.*, xiii, 2, pp. 50–57, 2 figs., 1935.

A tabulated account is given of the writer's experiments (1928–33) at Munich in the control of tobacco wildfire [*Bacterium tabacum*] from which the beneficial effects of regular applications of Bordeaux mixture (1 or 2 per cent.) in the seed-bed and field are apparent [*R.A.M.*, x, p. 629]. In the seed-bed satisfactory results were also given by various other copper-containing mixtures, including the dusts cusisa [ibid., xiii, p. 418] and cupulvit [ibid., xii, p. 31]. Cusisa and nosperit were also generally effective in the field tests in which, however, the outcome of the different treatments varied according to the year. Lime-sulphur was not found to be altogether reliable.

Stanley (W. M.). **Chemical studies on the virus of Tobacco mosaic. III. Rates of inactivation at different hydrogen-ion concentrations.** —*Phytopathology*, xxv, 5, pp. 475–492, 1935.

The rate of inactivation of the tobacco mosaic virus [*R.A.M.*, xiv, p. 260] in diluted, untreated, infectious juice of Turkish tobacco held at 20° or —14° C. was shown by experiments [the results of which are fully discussed and the relevant statistical data tabulated] to be inappreciable between P_H 3 and 8, fairly rapid between P_H 1·5 and 2·5 and 9 and 10, and very quick from P_H 0·5 to 1·5 and 11 to 12. Similar results were obtained with purified preparations, except that the rate is somewhat higher at P_H 3 and rather lower between P_H 9 and 11.

Reactivation of virus completely inactivated at P_H 1, 2, 11, or 12 was not effected by readjusting to P_H 6·8. The reaction of *Nicotiana glutinosa* plants to the tobacco mosaic virus inoculated at a range of P_H 2 to 10·5 did not vary to any extent, but Early Golden Cluster beans (*Phaseolus vulgaris*) were much more susceptible to inoculation with the virus at P_H 9 to 10·5 than at 0·5 to 3.

The tobacco ring spot and cucumber mosaic viruses were found to be much less stable than that of tobacco mosaic, inactivation increasing with a rise or fall in the hydrogen-ion concentration from about P_H 6.

Spencer (E. L.). **Influence of phosphorus and potassium supply on host susceptibility to yellow Tobacco mosaic infection.**—*Phytopathology*, xxv, 5, pp. 493–502, 3 figs., 2 graphs, 1935.

The influence of phosphorus (up to 150 mg. per diem per plant of

potassium or ammonium dihydrogen phosphate) and potassium (up to 500 mg. potassium sulphate) on the growth and reaction of tobacco to yellow mosaic (Johnson's virus No. 6) was investigated on the lines of the author's previous studies with nitrogen [*R.A.M.*, xiv, p. 474]. The inoculations were again made by the pin-puncture method and susceptibility gauged by the number of lesions per 100 punctures.

In the phosphorus series susceptibility increased *pari passu* with growth and was apparently only indirectly connected with the nutrient supply, whereas with potassium a definite correlation could be traced between the amount given and the degree of susceptibility as well as the extent of growth. The development of the plants was promoted by small and medium doses, while susceptibility to yellow mosaic was increased by minute amounts but diminished by moderately larger ones. It is possible, therefore, to reduce susceptibility to yellow mosaic without retarding growth by the application of potassium in moderation.

Nolla (J. A. B.). **Studies on disease resistance. I. A Tobacco resistant to ordinary Tobacco mosaic.**—*J. Agric. P.R.*, xix, 1, pp. 29–49, 8 pl., 1935.

The results of studies made in Porto Rico and at the Cornell and Wisconsin Universities showed that the Colombian Ambalema tobacco (*Nicotiana tabacum*), which in a recent communication (*J. Dep. Agric. P.R.*, xvii, pp. 301–303, 1933) was stated by him and Roque to be resistant to ordinary tobacco mosaic (Johnson's tobacco virus No. 1) [*R.A.M.*, xiv, p. 401], is susceptible to infection by inoculation at all stages of development. While plants inoculated when over four weeks old do not commonly show visible symptoms, seedlings and transplants inoculated at four weeks exhibit a clearing of the veins, followed by small chlorotic areas usually of a mild type. Later these plants apparently recover in the field and make normal growth, but their juices (as well as those of the older inoculated plants) always retain the virus, as shown by inoculations into Havana No. 38 tobacco and *N. glutinosa* plants. Quantitative studies (checked by statistical methods) indicated that Ambalema is significantly more resistant to tobacco virus No. 1 than is Havana No. 38, a factor in its resistance being apparently the inability of the virus to multiply in its tissues. A very similar type of resistance was also exhibited by this tobacco to yellow tobacco mosaic [tobacco virus No. 6: see preceding abstract] and to celery mosaic [ibid., xiv, p. 615], neither of which interferes significantly with its normal development. On the other hand, it was shown to be very severely affected by cucumber mosaic and yellow cucumber mosaic [ibid., xiv, p. 534], potato ring spot [ibid., xiv, p. 524], tobacco ring spot and spot necrosis, and to a somewhat lesser degree by potato mottle [see next abstract] and veinbanding viruses.

A mild form of ordinary tobacco mosaic was isolated from Ambalema plants inoculated with tobacco virus No. 1, and this remained constant on further inoculation; the virus appears to have properties similar to those of the original virus, of which it may possibly be an attenuated form [cf. ibid., xiv, p. 401].

Jones (L. K.) & Burnett (G.). **Virous diseases of greenhouse-grown Tomatoes.**—*Bull. Wash. St. agric. Exp. Sta.* 308, 36 pp., 8 figs., 1935.

After referring to the considerable losses annually sustained by tomato growers in the State of Washington owing to virus diseases, and listing the tobacco virus diseases that are transferable to tomato, the authors give brief descriptive notes on eleven other local and foreign virus diseases that may be important in glasshouse-grown tomato crops.

Observations and tests made from 1928 to 1934 showed that the commonest virus troubles affecting tomatoes in the local greenhouses are mosaic (tobacco virus No. 1) [see preceding and next abstracts], mottle (potato latent virus), and streak (a combination of mosaic and mottle) [*R.A.M.*, xiv, p. 404]. These do not appear until after the plants have been handled during transplanting or pruning. The latent virus may be introduced into tomato plants by human agency following the handling of potato tubers, the maximum number of successful transfers by this means (8 per cent.) occurring after the removal of sprouts from tubers. Sixty-three hosts of tobacco mosaic are listed.

When young tomato plants were set at weekly intervals in soil that had previously grown streak-infected tomato plants it was found that they could become infected with tobacco mosaic even five weeks after the removal of the diseased plants, especially when the soil was kept moist.

The results of experiments on the longevity of the viruses in artificially infected material, placed in soil or stored in the greenhouse, showed that the tobacco virus No. 1 could remain infective in the streak-infected tomato tops and roots in soil for at least six weeks and probably as long as the tissue remained undecayed; the latent virus remained active for three weeks in two tests and for four weeks in the air-dried tissue. Only a very small percentage of tomato plants set in soil inoculated with tobacco mosaic contracted the disease [ibid., ix, p. 207].

Tests showed that mottle, mosaic, and streak may reduce the yield of tomato fruits by 1·8, 15, and 44·4 per cent., respectively.

Shapovalov (M.) & Dufrénoy (J.). **Cytologische Beobachtungen an einer Viruskrankheit vom Typus 'streak' oder 'Strichel'.** [Cytological observations on a virus disease of the 'streak' or 'Strichel' type.]—*Phytopath. Z.*, viii, 3, pp. 297–301, 8 figs., 1935.

Tobacco plants inoculated with material from a tomato affected by 'combination streak', a mixture of Johnson's tobacco mosaic virus No. 1 and virus X (the latent potato mosaic virus) [*R.A.M.*, xiii, p. 278; xiv, p. 261, and preceding abstract], developed the same external symptoms as those induced by virus No. 1 alone, while the cytological reactions were also identical. The mitochondria divide very rapidly and many form starch by conversion into amyloplasts; vacuolated, striated, and plate bodies are formed in the cytoplasm. The virus No. 1 from streak also caused typical reactions on *Nicotiana glutinosa*. Starch formation and vacuolization are followed by plasmolysis, the cells surrounding the

central necrotic zone surviving long enough to form phenol-like substances in some of their vacuoles. A correlation is believed to exist, in virus as in parasitic diseases, between the capacity for rapid and abundant phenol production and the limitation of pathogenic extension.

AINSWORTH (G. C.). **Virus diseases (1).**—*Rep. exp. Sta. Cheshunt, 1934*, pp. 60–66, 1935.

During 1934 *Hippeastrum calceolaria*, *Richardia* [*Zantedeschia aethiopica*: *R.A.M.*, xiv, p. 366], and *Schizanthus* were noted as hosts of tomato spotted wilt [ibid., xiv, p. 610] which was also recorded for the first time from Jersey and Guernsey.

Of 26 samples of American and Empire tobacco smoked by the staff at Cheshunt 23 showed the presence of a virus, which in all cases except one, where it was not identified, was that of tomato mosaic (tobacco virus No. 1) [cf. ibid., xiv, p. 262 and preceding abstracts].

KADOW (K. J.) & SHROPSHIRE (L. H.). **Tomato diseases and insect pests: identification and control.**—*Circ. Ill. agric. Exp. Sta.* 428, 36 pp., 13 figs., 1935.

Popular notes are given on some well-known diseases of tomatoes and their control in Illinois, with supplementary sections on soil sterilization methods [*R.A.M.*, xiv, p. 460] and on fungicides.

ORCHARD (O.). **The effect of sulphur vaporization on Tomato leaf mould.**—*Rep. exp. Res. Sta. Cheshunt, 1934*, p. 80, 1935.

Experiments at Cheshunt designed to control tomato leaf mould [*Cladosporium fulvum*: *R.A.M.*, xiii, p. 76] by treatment with vaporized sulphur (on 5th June, before infection appeared, and thereafter at intervals of 14 days) gave entirely unsuccessful results, the disease appearing within about ten days and spreading rapidly over all the plants [ibid., vii, p. 749].

LYUBARSKY (L. V.). Материалы по грибным болезням леса и разрушителям древесины в южно-уссурийском крае. [Contribution to the knowledge of fungal diseases of forest trees and timber rots in the south Ussuri region.]—*Bull. far-east. Br. Acad. Sci. U.S.S.R.*, Vladivostok, *1934*, 9, pp. 76–104, 16 figs., 1934. [English summary. Received July, 1935.]

The author states that, owing to the local warm and damp climate, coniferous and broad-leaved forests, especially in low-lying, periodically flooded areas, in the southern Ussuri river basin suffer considerable damage from parasitic and wood-destroying fungi. Among the 89 species (brief descriptions of which are given) which were collected from 1929 to 1931, the economically most important ones are *Trametes pini* [*R.A.M.*, xiii, p. 666], responsible for the killing of 70 per cent. of the trees in many stands of *Picea ajanensis* [*P. jezoensis*] and *Pinus koraiensis*, and *Fomes igniarius* [ibid., xiii, p. 604] which attacks many broad-leaved species and is particularly prevalent on the Manchurian walnut (*Juglans manshurica*). The paper terminates with a list of the

fungi arranged in systematic order, with the indication of the hosts and substrata on which they were found.

Orloś (H.). **Sprawozdanie z działalności Instytutu Badawczego w dziedzinie fitopatologji za rok 1933.** [Report on the phytopathological activity of the Research Institute in 1933.]—*Trav. Inst. Rech. For. doman. Varsovie*, Ser. A, 11, pp. 7–19, 1 pl., 5 maps, 1935. [French summary.]

In this report the author gives brief notes on the distribution and intensity of various major diseases of forest trees in Poland in 1933, illustrated by maps in the case of *Lophodermium pinastri* [*R.A.M.*, xii, 604], *Trametes pini* [see preceding abstract], *T. radiciperda* [*Fomes annosus*: ibid., xiii, p. 738], *Armillaria mellea*, and *Melampsora pinitorqua* [ibid., x, p. 418]. In general, surveys in that year showed that the phytosanitary condition of the Polish forests is very unsatisfactory.

Forest disease control in New England.—*J. For.*, xxxiii, 5, pp. 469–473, 1935.

In this report of the New England Section of the Society of American Foresters notes are given on certain problems of forest pathology that have come into prominence during recent years. These include the *Nectria* cankers of beech and other hardwoods and of walnut [*R.A.M.*, xiv, pp. 338, 407]; *Stereum gausapatum* causing heart rot of oak [ibid., xi, p. 497; xiii, p. 810] and *S. sanguinolentum* attacking conifers [ibid., ix, p. 79]; leaf cast of red pines [*Pinus resinosa*] due to *Lophodermium pinastri* [see preceding abstract] in Massachusetts nurseries; and Dutch elm disease (*Ceratostomella ulmi*) [ibid., xiv, p. 537].

Davidson (R. W.). **Forest pathology notes.**—*Plant Dis. Reptr*, xix, 7, pp. 94–97, 1935. [Mimeographed.]

Notes are given on *Stereum gausapatum* [see preceding abstract], shown by recent investigations in Virginia, New Jersey, and Pennsylvania to be probably the most important of all the fungi causing butt rot of sprout oak, the black and scarlet [*Quercus velutina* and *Q. coccinea*] suffering much more severely than the chestnut [*Q. prinus* L.] and white [*Q. alba*]. 'Brown oak' is caused by *Fistulina hepatica* [*R.A.M.*, iv, p. 135; cf. xiv, p. 414], the greyish-brown ('tortoiseshell') mottling produced by which is stated by P. Groom (*Quart. J. For.*, xiv, p. 103, 1920) to be of value in furniture manufacture. The *Ptychogaster* stage is readily formed on potato-dextrose or malt extract agar after about six weeks at room temperature. *Paecilomyces varioti* [*R.A.M.*, xiii, p. 97] is a common concomitant of the brown oak condition.

Rhizina inflata [*R. undulata*: ibid., xii, p. 798] was observed fruiting on the soil in a Maryland nursery where red pine [*Pinus resinosa*] seedlings were found by C. Hartley to be dying off, probably as a result of infection by the fungus.

Gonatorrhodiella parasitica Thaxter was found parasitizing *Trichoderma lignorum* [ibid., xiv, p. 551].

Birch (*Betula nigra*) seeds were observed to be infected by a fungus identified by Miss E. K. Cash as *Sclerotinia betulae* [ibid., iv, p. 199].

Westerdijk (Johanna). **Kort verslag van de onderzoekingen over de Iepenziekte, verricht in het Laboratorium Willie Commelin Scholten, gedurende 1934.** [A brief report on the investigations on the Elm disease conducted in the Willie Commelin Scholten Laboratory during 1934.]—*Tijdschr. PlZiekt.*, xli, 5, pp. 101–103, 1935.

The writer briefly indicates the lines of research pursued during 1934 in connexion with the study of the elm disease caused by *Graphium* [*Ceratostomella*] *ulmi* in Holland, an extended account of which is given in the next abstracts.

Buisman (Christine). **Verslag over de onderzoekingen betreffende de Iepenziekte, verricht in het Phytopathologisch Laboratorium 'Willie Commelin Scholten' te Baarn, gedurende 1934.** [Report on the investigations relating to the Elm disease conducted in the 'Willie Commelin Scholten' Phytopathological Laboratory, Baarn, during 1934.]—*Tijdschr. PlZiekt.*, xli, 5, pp. 104–120, 4 pl., 1935.

Some 30,000 elms were uprooted in Holland on account of infection by *Graphium* [*Ceratostomella*] *ulmi* [see preceding and next abstracts] in 1934, as compared with 70,000 in the previous year [*R.A.M.*, xiii, p. 548]. The writer's general impression was that the disease was less severe in 1934 than in 1933. Nine more cases were reported from the Wadden islands. Notes are given on the distribution of *C. ulmi* in foreign countries [ibid., xiv, p. 264].

Growers were supplied with material from seedlings selected for resistance to *C. ulmi* with the proviso that no commercial use should be made of the resultant grafts before the end of 1935. Promising results were again given in the inoculation experiments with the Asiatic varieties, *Ulmus wallichiana* and *U. pumila* and its var. *pinnato-ramosa*. *U. wilsoniana*, ordinarily highly resistant, proved susceptible in this series of trials. *U. laciniata nikkoensis*, *U. macrocarpa*, and the Karagatch elm also reacted positively to the fungus in a number of cases, especially at Utrecht, though they are definitely less susceptible than the native elm. *U. japonica* again showed moderate susceptibility. Among the European varieties, a few individuals of *U. glabra* appear to be practically immune from infection. *U. procera berardi* is resistant but unsuited for extensive cultivation by reason of its slow and sparse growth. *U. foliacea sowerbyi* and *U. hillieri* failed to maintain their early promise.

An anatomical study of wood naturally and artificially infected by *C. ulmi* revealed an accumulation of starch in the parenchyma cells of the latest formed annual rings both above and below the site of infection, a phenomenon observed also in infections with *Verticillium albo-atrum*.

Buisman (Christine). **Het Iepenziekte-probleem in Italie.** [The Elm disease problem in Italy.]—*Ned. Boschbouw-Tijdschr.*, viii, 5, pp. 179–180, 1935.

Since the writer's previous note on the ravages of the elm disease (*Graphium* [*Ceratostomella*] *ulmi*) in the province of Emilia, Italy [*R.A.M.*, xii, p. 734, and preceding abstract], a determined effort is

stated to have been made to replace the susceptible European field elm [*Ulmus campestris*] by the highly resistant *U. pumila* (?) *pinnato-ramosa* [ibid., xiii, p. 549]. Thus, in April, 1935, a Bologna nurseryman is reported to have delivered 1,000,000 runners and seedlings of the latter for planting in the affected areas. *U. pumila* (?) *pinnato-ramosa* has so far proved very satisfactory both as a support for vines and as fodder for livestock. *Nectria cinnabarina*, which hampers the cultivation of *U. pumila* in Holland [cf. ibid., x, p. 348], is apparently not a limiting factor in Italy.

ROEPKE (W.). **Kort verslag over het Iepenziekteonderzoek verricht aan het Laboratorium voor Entomologie der Landbouwhoogeschool gedurende het jaar 1934.** [A brief report on the Elm disease investigation conducted at the Entomological Laboratory of the Agricultural College during the year 1934.]—*Tijdschr. PlZiekt.*, xli, 5, pp. 121–124, 1935.

In this report of work carried out by J. J. Fransen, the following points are of interest. A method was devised of contaminating elm-bark beetles (*Scolytus scolytus* and *S. multistriatus*) with *Graphium* [*Ceratostomella*] *ulmi* spores for use in infection trials on resistant varieties [see preceding abstracts]. Little difference was observed between the natural infection transmitted by beetles and that artificially produced by injections into the tree.

The presence of the mite *Pseudotarsonemoides innumerabilis* [cf. *R.A.M.*, xiv, p. 63] was found to promote the fructification of *C. ulmi* in the *Scolytus* nymphal chamber.

The practical value of trap trunks in the control of the bark beetles is reported to have been demonstrated.

SERVAZZI (O.). **Contributi alla patologia dei Pioppi. II. La 'tafrinosi' o 'bolla fogliare' dei Pioppi.** [Contributions to the pathology of Poplars. II. 'Taphrinosis' or 'leaf blister' of Poplars.]—*Difesa Piante*, xii, 2, pp. 48–62, 3 figs., 1935.

This is a brief account of the author's observations on the poplar leaf blister (*Taphrina aurea*) [*R.A.M.*, x, p. 418] in 1933 and 1934 in Piedmont, including some notes on the symptoms of the disease and on the morphology of the causal organism, together with its full synonymy. In indicating the wide range of poplar species which have been recorded as hosts of the fungus in literature, it is stated that in Piedmont leaf blister was only seen on *Populus nigra*, *P. pyramidalis*, and the Canadian and Carolina poplars [*P. canadensis* and *P. deltoides*], infection being very limited on all four species in 1933, but very severe and widespread on the two last-named species in 1934, while still slight and rare on the other two. *P. alba* remained immune from the disease in both years, even when growing in close proximity to severely diseased trees of the other species. This is considered to give some support to the view expressed by certain earlier workers that *T. aurea* includes more than one physiologic form, specialized to different species of poplar. A bibliography of 70 titles is appended.

Meginnis (H. G.). **Losses of Black Locust planting stock in storage.**—*J. For.*, xxxiii, 5, pp. 534–535, 1935.

Black locust [*Robinia pseud-acacia*] planting stock stored in heavy soils in Marshal County, Missouri, is stated to be liable to a rank growth of [unspecified] moulds, covering the buried portions so that the roots decay within a few days. The bark and cambium around and above the root collar are also rotted, the seedlings often being entirely girdled. Unusually severe losses from this source occurred during a warm, damp spell early in April, 1934, necessitating the rejection of fully 50 per cent. of the stock. Heeling the stock in loose sand, 1 ft. or more in depth, seems to afford adequate ensurance against such losses.

Tubeuf [C. v.]. **Ausführung der organisierten praktischen Bekämpfung des Blasenrostes fünfnadeliger Kiefern.** [The execution of the organized practical control of blister rust of five-needled Pines.]—*Z. PflKrankh.*, xlv, 5, pp. 297–301, 1935.

Suggestions are made for the organization of the campaign proposed by the writer for the extermination in Germany of the white pine (*Pinus strobus*) blister rust (*Cronartium ribicola*) [*R.A.M.*, xiv, p. 541]. In addition to the prohibition of trading in seed and seedlings of *P. strobus*, *P. monticola*, and *P. peuce*, and the systematic destruction of diseased material, the regulations must include the eradication of black currants, *Ribes aureum*, and other susceptible varieties [ibid., xiii, p. 136]; on the other hand, the absolutely immune Red Dutch currant [ibid., xiv, p. 377] may be planted with impunity.

Wałek-Czernecka (Anna). **Grzyby na placach tartacznych.** [Fungi in sawmills.]—*Trav. Inst. Rech. For. doman. Varsovie*, Ser. A, 12, pp. 25–40, 1935. [French summary.]

The author lists 52 species of wood-destroying fungi which were collected by her in Poland in 1933 in the premises of four State sawmills, the records from each sawmill being indicated. While admittedly not exhaustive, this list includes all the species that are known to cause severe rotting of constructional and other timbers, and suggests that much of the infection of building timber occurs in sawmills either during storage or during processing. Preventive and control measures based on plant hygiene at the sawmills are very briefly discussed.

Wright (E.). **Trichosporium symbioticum n.sp., a wood-staining fungus associated with Scolytus ventralis.**—*J. agric. Res.*, l, 6, pp. 525–538, 7 figs., 1935.

A morphological and cultural account is given of a wood-staining fungus which is considered to be new to science and is named *Trichosporium symbioticum*, with Latin and English diagnoses. It was found frequently in the galleries of the engraver beetle *Scolytus ventralis* in white firs (*Abies concolor*) throughout the Sierra Nevadas in California. The fungus is characterized by septate, hyaline to brown, intercellular hyphae, averaging 3 μ in width. The conidiophores are simple or branched, hyaline, 1 to 1·5 μ thick, and bear clusters of terminally or subterminally attached, hyaline, subglobose to ovoid spores, 1·8 to

2·4 μ in diameter. On malt agar the fungus forms a white, flocculent aerial mycelium, bearing erect conidiophores 1·5 to 2 μ thick, with spores 1·5 to 4 μ in diameter, and a submerged mycelium at first hyaline but later cinnamon-drab to fuscous brown.

Special tests showed that the engraver beetles carry the fungus on the surface of the body, rarely in the digestive tract, and that the fungus is definitely pathogenic to the white fir, killing the cambium as it advances. There is some evidence that the relationship of the beetle and fungus may be symbiotic, the beetle benefiting by the lessened resistance of the tree and the fungus by being carried to new substrata by the insect.

Campbell (W. G.) & Wiertelak (J.). **The chemistry of the white rots of wood. IV. The effect on wood substance of Ustulina vulgaris Tul.**—*Bio-chem. J.*, xxix, 6, pp. 1318–1321, 1935.

Ustulina vulgaris has been found by chemical analysis at the Forest Products Research Laboratory, Princes Risborough, to induce by its parasitic action on lime (*Tilia vulgaris* Heyne) wood decomposition of the 'white rot' type [cf. *R.A.M.*, xii, p. 343]. Both lignin and carbohydrates are attacked and alkali-solubility, calculated as a percentage of sound wood, steadily decreases as decay advances. In the 'red wood' zone, between the sound and diseased areas, a loss of approximately 4·6 per cent. of the wood substance was sustained and accounted for almost in its entirety by depletion of the 'Cross and Bevan' cellulose. At the most advanced stage of rotting examined about one-third of the cellulose and one-quarter of the lignin were decomposed, while exhaustion of the furfuraldehyde-yielding complexes was also pronounced.

The saprophytic action of *U. vulgaris* on beech wood [ibid., xiii, p. 809], though slow, was similar. Experimental data obtained from decayed lime wood indicate that the fungus must markedly impair the mechanical properties of its host.

Gewecke (F.) & Kärst (O.). **Vergleichende Versuche mit Holzschutzmitteln (Feuer, Fäulnis und Schädlingsfrass).** [Comparative experiments with wood preservatives (fire, decay, and insect depredations).]—*Angew. Chem.*, xlviii, 19, p. 272, 2 graphs, 1935.

The writers' tests are stated to have shown that 'Xylamon-Feuerschutz', containing besides fire-repellent constituents a high proportion of chlorinated naphthalenes, affords excellent protection against wood-destroying fungi and insects [cf. *R.A.M.*, xiii, p. 138].

Treating ties with Z.M.A.—*Rly Engng Maint., 1935*, 4, pp. 228–229, 1935.

During the period of the depression it was necessary as far as possible to replace the creosote-petroleum treatment of railway sleepers [*R.A.M.*, xiv, p. 545], which costs 20 to 25 cents more per sleeper than zinc chloride or zinc-meta-arsenite [ibid., xi, pp. 84, 686], by the two latter preservatives on the Great Northern Railway, United States. In 1932 the number of sleepers treated with zinc-meta-arsenite was 290,680, the corresponding figures for 1933 and 1934 being 231,162

and 198,830, respectively, compared with an average of treated sleepers for the last ten years of 1,560,000. Nearly all the wood impregnated with zinc-meta-arsenite from 1932 to 1934 was western larch [*Larix occidentalis*]. Both the empty- and full-cell processes were used, the minimum net retention of dry disinfectant being $\frac{1}{6}$ lb. per cu. ft. of wood. The strength of the preservative solution was 1·65 per cent. and the temperature during impregnation ranged from about 70° to 80° F.; the average treating time per charge was ten hours. Sleepers thus treated in a test plant in 1930 were unaltered by 1934.

Zinc-meta-arsenite has also been extensively used of recent years for the treatment of telegraph poles on the Great Northern Railway (14,246 Douglas fir [*Pseudotsuga taxifolia*] from 1930 to 1932, inclusive), a full-length pressure impregnation being given with a minimum net retention of $\frac{1}{4}$ lb. dry zinc-meta-arsenite per cu. ft. These poles were also found to be in good condition in 1934.

Rudge (E. A.). **The decay of wood and the formation of coal.**—*J. Soc. chem. Ind., Lond.*, liv, 21, pp. 499–501, 1935.

In connexion with a discussion of the processes involved in coal formation, the writer briefly summarizes the results of his recent investigations, from a chemical angle, on the related phenomenon of timber decay [*R.A.M.*, vii, p. 195; xiv, p. 542]. The latter has been found to occur only in the presence of moisture in quantity compatible with a condition of ionic conductivity. For all woods examined this minimum moisture content is about 20 per cent. of the dry weight. Decay is uniformly attended by an enhanced content of mineral matter, due to one of three factors, (1) organic depletion by micro-organisms, (2) ionic migration of the inherent mineral matter of the wood towards the affected region, and (3) infiltration of mineral matter from some external source. Of all the inorganic ions normally present under conditions of natural decay, the bicarbonate is specific in relation to the phenomenon, the importance of the cation lying solely in the provision of a soluble bicarbonate, for which purpose the calcium, iron, and magnesium cations are indicated.

The function of the bicarbonate ion in causing the incipient degradation of the woody tissue is so far a matter of analogy and conjecture, but there are good grounds for believing it to be parallel to the behaviour of the thiocarbonate ion in the chemistry of viscose. It is apparent that the cellulose constituent of the wood is primarily affected, and the complex formed is readily oxidized. Cellulose degradation is ordinarily a slow process, which may be accelerated, however, by the use of high concentrations of bicarbonates under pressure and at temperatures of 60° to 80° C. The subsequent tissue wastage by fungal and bacterial invasion may, under favourable conditions, rapidly eclipse the primary effects of infiltration. An analysis of the cellulose, lignin, and mineral matter values of a peat profile suggests the occurrence of infiltration from the floor of the deposit upwards, producing a general effect of great similarity to that associated with wood decay. The position of lignin in the scheme of humification is problematical. During the earlier stages of wood decay the lignin constituent shows no alteration either in total content or in chemical character, but there is definite

indication of depletion in the later phases. It would seem, therefore, that cellulose and lignin are in equilibrium capable of adjustment during depletion by decay.

SMITH (K. M.). **A virus disease of cultivated Crucifers.**—*Ann. appl. Biol.*, xxii, 2, pp. 239–242, 2 pl., 1935.

A brief account is given of a disease which was first noticed in the autumn of 1934 in the vicinity of Cambridge on a number of cabbages, Brussels sprouts, and other *Brassica* spp., characterized on the older leaves by uniformly distributed, almost black, deeply sunken necrotic rings; in smaller plants the necrosis may take the form of circular or irregular lesions. The trouble was shown to be transmissible to cabbage by sap transfusion and to be carried in the field by the aphid *Myzus persicae*. It was also easily transmitted by inoculation to *Nicotiana glutinosa*, *N. langsdorfii*, and White Burley tobacco, the symptoms on which are briefly described. Preliminary comparative tests show that the virus associated with the condition is different from those of tomato spotted wilt [see above, p. 662] and cabbage mosaic [*R.A.M.*, ix, p. 572; cf. also XIV, p. 207], the latter of which is widespread in the Cambridge district. Further work is in progress to determine the effect of the virus on certain other cruciferous crops.

WHITEHEAD (T.). **A note on 'brown heart', a new disease of Swede, and its control.**—*Welsh J. Agric.*, xi, pp. 235–236, 1935.

'Brown heart' of swedes [*R.A.M.*, xiv, p. 558] recorded in Ireland in 1913, was first observed in north Wales in November, 1932, and in the last two years has also been reported from Scotland and England. No variety appears to be immune [cf. ibid., xiv, p. 70], though there is a wide range of varietal susceptibility. In tests on four farms borax applied at the rate of 10 lb. per acre reduced infection to 0, 13 (1·3 per cent. badly diseased), 8 (1·3), and 9 (2) per cent., respectively, as compared with 36, 55, 29, and 37 per cent. in the corresponding untreated control plots. No further improvement resulted from doubling this rate of application.

HARTER (I. L.), ANDRUS (C. F.), & ZAUMEYER (W. J.). **Studies on Bean rust caused by Uromyces phaseoli typica.**—*J. agric. Res.*, l, 9, pp. 737–759, 4 graphs, 1935.

After a brief account of the distribution and economic importance of bean (*Phaseolus vulgaris*) rust (*Uromyces phaseoli typica* Arthur) [*U. appendiculatus* Fr.: *R.A.M.*, xiv, p. 416] in the United States, the authors give details of experiments the results of which showed that the rust may be made to complete its life-cycle in the greenhouse. Besides the common strain which freely produced teleutospores, a slight admixture was found in some collections of a second strain which, although morphologically indistinguishable from the first, never formed teleutospores and also differed in its pathogenicity to certain bean varieties. The abundance and time of formation of teleutospores in the first strain was found to be controllable by modifying the metabolism of the host [ibid., vii, p. 531]. Teleutospores were shown to be still viable at the end of 182 days, and germination of uredospores was

obtained at the end of 26 but not of 28 weeks after formation. The optimum temperature for the germination of the uredospores was about 14·5° C., and that for infection approximately 17°. Under controlled conditions no infection resulted when the inoculated plants were kept at a relative humidity below 95 per cent. Infection to be successful appeared to require the presence of condensation water or an initial excess of water on the plants. There was evidence that environmental conditions unfavourable for the growth of the host also delay or reduce infection.

Resistance tests of 61 varieties of garden and field beans showed that even the most resistant varieties show a trace of rust under very favourable conditions. Only two pole varieties (Lazy Wife and King Mammoth Horticultural) showed any marked degree of resistance, while seven out of eighteen field varieties showed sufficient resistance to deserve recommendation in localities subject to rust epidemics. All the American commercial varieties of Lima bean (*P. lunatus macrocarpus*) which were tested, except Wood Prolific, Sieva, and Henderson, were highly susceptible.

The investigations indicate that outbreaks of bean rust are possible in regions where a relative humidity of 95 per cent. or over is maintained for any period of eight consecutive hours or more. Preliminary tests suggested sulphur dusting as an effective means for the control of the rust.

Reichelt (K.). **Anbauversuche mit Buschbohnen.** [Cultivation experiments with Bush Beans.]—*Obst- u. Gemüseb.*, lxxxi, 4, pp. 60–61, 1935.

Among the characters taken into account in a series of field experiments carried out in the Hanover district of Germany from 1926 to 1929 with 19 white-seeded, green-podded bean [*Phaseolus vulgaris*] varieties in comparison with the dark-seeded, stringless Geneva Market was reaction to anthracnose [*Colletotrichum lindemuthianum*: *R.A.M.*, xiii, pp. 318, 741]. Highly susceptible to this disease were Kaiser Wilhelm, Kaiser Wilhelm Riesen [Giant], Nordstern, and Schlachtschwert; moderately so, Hinrichs Riesen stringless, Weisse Treib [White Forcing], and Early White Zucker Brech; while comparative resistance was shown by White Flageolet, Hinrichs Riesen (white ground), Zucker Perl Perfektion, Alpha, Ilsenburg White, White Kidney, Volgers Perl, Zucker Perl Prinzess, Holsteiner, Konserva, and Zucker Butter Brech.

Tompkins (C. M.) & Gardner (M. W.). **Relation of temperature to infection of Bean and Cowpea seedlings by Rhizoctonia bataticola.**—*Hilgardia*, ix, 4, pp. 219–230, 2 figs., 1935.

In the experiments briefly reported in this paper the authors compared the response to temperature in culture of the strain of *Rhizoctonia bataticola* (*Macrophomina phaseoli*) responsible for the seedling stem blight of beans (*Phaseolus vulgaris*) in California [*R.A.M.*, xiii, p. 344] with that of strains isolated from sugar beet, cowpea, sweet potato, begonia, citrus, strawberry, cotton, of Haigh's A (*R. lamellifera*) [ibid., xiv, p. 233], B, and C (*M. phaseoli*) strains, and of *R.* [*Corticium*] *solani*. None of the organisms produced pycnidia, and all, with the exception

of Haigh's A and B strains, formed small sclerotia, being therefore referable to Haigh's C (*M. phaseoli*) group [ibid., xiv, p. 561]. Except the citrus strain which grew only about half as rapidly as the others and had a lower temperature optimum (28° C.), all the strains developed at temperatures from 25° to 34°, with an optimum at about 31°.

The pathogenicity of the strains to bean and cowpea seedlings was tested at temperatures ranging from 20° to 40°; the results showed that with the exception of the citrus and Haigh's A [loc. cit.] and B strains, all the isolations were pathogenic to beans at all the temperatures, high percentages becoming infected at 31°, 34°, and 37°, and that all strains attacking the bean (except the begonia strain) were also pathogenic to cowpea, although some differences in degree of pathogenicity were noted. The cowpea strain was distinctly the most pathogenic to cowpea seedlings. Most of the infection of both beans and cowpeas occurred on the cotyledons. *C. solani* was shown to be pathogenic to both hosts at the lower temperatures, and attacked the cotyledons to a considerable extent.

Otomo (S.). **The molds growing on Soybean cakes.**—*J. agric. chem. Soc. Japan*, xi, pp. 124–146, 1935. [Abs. in *Chem. Abstr.*, xxix, 13, p. 4406, 1935.]

Eight varieties of *Aspergillus*, three of *Penicillium*, *Monilia* sp., and *Sphaerella* sp. were isolated from mouldy soy-bean cakes [cf. *R.A.M.*, xii, p. 593]. Among them were found *A. herbariorum* var. *minor*, *A. repens*, *A. amstelodami* [ibid., x, p. 597], and *P. waksmani* Zaleski. The organisms, when grown on soy-bean cakes with a water-content of 31·63 per cent., caused a decrease in the quantities of fat, soluble carbohydrates, and water, while the amount of total nitrogen remained constant. Mouldy soy-bean cake containing 7·83 per cent. ash, 55·10 per cent. crude protein, 6·86 per cent. crude fat, 7·90 per cent. crude fibre, and 15·82 per cent. soluble carbohydrates (dry weight) was added to the ration for white rats with a favourable effect on the health of the animals [cf. ibid., xiv, p. 603].

Haenseler (C. M.). **Damping-off of seedlings controlled by new method of using formaldehyde.**—*Agric. News Lett.*, iii, 5, pp. 7–8, 1935.

Preliminary tests conducted in New Jersey in 1929 showed that beet damping-off [largely due to *Pythium ultimum* and *Corticium solani*: *R.A.M.*, xiii, p. 644] could be almost completely eliminated by sprinkling the beds immediately after, or within a few hours of seeding with 1 part formalin (38 to 40 per cent. formaldehyde) in 200 parts of water at the rate of $1\frac{1}{2}$ pints per sq. ft. of soil surface. During the past five years this treatment has given consistently excellent results in commercial greenhouses. Used at a strength of 1 in 300 it has also controlled satisfactorily damping-off of cucumber, melon, peas, tomato, eggplant, and pepper [*Capsicum annuum*].

Wilhelm (A. F.). **Die Gelbfleckigkeit des Spinats ('Spinatkrankheit').** [Spinach mosaic ('Spinach disease').]—*Obst- u. Gemüseb.*, lxxxi, 4, pp. 56–58, 2 figs., 1935.

The losses from spinach mosaic in the foothills between Cologne and Bonn in 1934 are estimated at 70 to 80 per cent. of the crop [*R.A.M.*,

x, p. 219]. Under local conditions cucumbers are the most important alternate host of the virus, which readily passes from them to spinach and vice versa. The supposed resistance to mosaic of the Viroflay, Riesengaudry, Juliana, and Victoria varieties has not been maintained, their susceptibility being equal to that of the locally popular Rhenish Giant; Virginia Savoy blight-resistant, on the other hand, is practically immune. Direct control of the aphid vectors of the disease being economically impracticable, it is necessary either to exclude spinach from the fields during the period of reproduction and spread of the insects, or to plant the crop at such times that it is no longer exposed to infection at the season of aphid activity. To this end winter spinach should be sown as late and the summer crop as early as possible. Diseased plants should be eradicated and the fields broken up after harvesting, while proximity of spinach to cucumber is to be avoided.

Destructive Insect and Pest Acts, England. The Fruit Tree Pests (Buckinghamshire) Order of 1935. Dated May 24, 1935.—4 pp., 1935.

As from 3rd June, 1935, the Local Authority for the Administrative County of Buckingham or the Borough of Chipping Wycombe, as the case may be, is authorized to order the inspection and, if necessary, the treatment of any apple and pear trees for scab [*Venturia inaequalis* and *V. pirina*: *R.A.M.*, xiv, p. 336].

Legislative and administrative measures. Sweden.—*Int. Bull. Pl. Prot.*, ix, 5, pp. 115–116, 1935.

As from 12th October, 1934, phytosanitary certificates will be issued by the Swedish Plant Protection Service in respect of potato consignments destined for export free from wart disease (*Synchytrium endobioticum*) [*R.A.M.*, viii, pp. 56, 736] and showing a total not exceeding 4 per cent. of infection by blight (*Phytophthora infestans*), dry rot (*Fusarium*), common and powdery scab (*Actinomyces* [*scabies*] and *Spongospora subterranea*), bacterial (wet rot) and miscellaneous diseases.

United States Department of Agriculture. Bureau of Entomology and Plant Quarantine. Service and regulatory announcements, January–March, 1935.—pp. 1–3, 1935.

Amendment No. 1 to the rules and regulations supplemental to Notice of Quarantine No. 38 (revised) provides that, as from 20th February, 1935, official permits are required for the inter-State movement between 13 protected States [which are listed] of any species of *Berberis* or *Mahonia*, apart from *B. thunbergii* or its horticultural varieties and rootless cuttings of *Mahonia* for decorative purposes only [*R.A.M.*, xiv, p. 63]. Such permits will not be issued in respect of species, varieties, or hybrids of *Berberis* or *Mahonia* sufficiently susceptible to black stem rust [*Puccinia graminis*] to involve risk of the spread of this disease.

Supplement No. 1 to the foregoing revision (4th March, 1935) adds *B. mentorensis* Ames (MS.), a new rust-resistant hybrid, to the list of species eligible for shipment under the usual restrictions into and between the protected States.